

MARINE REVIEW

VOL. XVIII.

Published every Thursday at
418-19 Perry-Payne Bldg.

CLEVELAND, O., DECEMBER 15, 1898.

Entered at Cleveland Postoffice
as second class matter.

No. 23.

FOURTEEN MILLIONS.

IRON ORE SHIPMENTS FROM THE LAKE SUPERIOR REGION DURING 1898 WILL AGGREGATE THAT NUMBER OF GROSS TONS—COMPLETE REPORTS SHOW LAKE SHIPMENTS OF 13,650,788 TONS—STILL THE STOCKS AT LAKE ERIE PORTS ARE LESS THAN THEY WERE A YEAR AGO.

An output of 14,000,000 gross tons is to be credited to the Lake Superior iron ore region for 1898. This will be more than a million and a half tons in excess of last year, when the output exceeded all previous years. Official returns from dock managers at all ore shipping ports have been received by the Marine Review, and the shipments by lake are found to foot up 13,650,788 gross tons. Rail shipments, which were quite heavy, especially to Chicago early in the year, will probably approximate 500,000; in any event, the rail shipment will be sufficient to bring the total up to fourteen millions. Of the increase of 1,435,143 gross tons over last year, full 1,250,000 tons was shipped in the first month of the season. There was practically no gain in shipment after the middle of May. This is one of the most important results of a very early opening of navigation in 1898. The season was a very long one. The principal gains are in shipments from Escanaba, Marquette and Ashland. The big Minnesota mines did not get the increased output that was expected. Duluth shipments show an increase of only 254,546 tons, while at Two Harbors the gain over last year is only 41,780. Other gains over last year are: Escanaba, 501,392 tons; Marquette, 300,454; Ashland, 323,451; Superior, 18,578. At Gladstone there is a decrease of 5,058 tons compared with last year. Shipments of the several ports during five years past are recorded in the following table:

LAKE SHIPMENTS OF IRON ORE—GROSS TONS.

PORTS.	1895	1897	1896	1895	1894
Escanaba	2,803,513	2,302,121	2,321,931	2,860,172	1,644,776
Marquette	2,245,973	1,945,519	1,564,813	1,079,485	1,424,850
Ashland	2,391,088	2,067,637	1,566,236	2,350,219	1,738,590
Two Harbors	2,693,245	2,651,465	1,813,992	2,118,156	1,373,253
Gladstone	335,956	341,014	220,887	109,211	79,208
Superior	550,403	531,825	167,245	117,884	.....
Duluth	2,630,610	2,376,064	1,988,932	1,598,783	1,369,252
Total by lake	13,650,788	12,215,645	9,644,036	10,233,910	7,629,829
Total by rail .....	.....	253,993	290,792	195,127	118,394
Total shipments .....	.....	12,469,638	9,934,828	10,429,037	7,748,223

No attempt has been made to give shipments by ranges or to make up a summary of the output of the principal mines, as the figures would be somewhat doubtful in view of uncertainty as to rail shipments. A full summary of the rail movement and complete shipments by mines will be published early in January. It may be well to note, however, that the output from the Mesabi range this year aggregates 4,594,822 gross tons, against 4,280,873 gross tons in 1897.

INSURANCE PROBLEM—HEAVY LAKE LOSSES.

Insurance losses, hull and cargo, on the great lakes during the season just closed will foot up \$1,250,000 on vessels that have actually passed out of existence. This figure has reference only to total losses, or in other words to cases where the entire insurance was paid. It is not possible to secure figures covering the numerous heavy repair bills on steel vessels due to groundings, collisions, etc., or the hundreds of partial losses of one kind and another. If these were included, it is more than probable that the aggregate would be almost double that of any previous year. The weather since October has been a continuous succession of gales. The half dozen large vessels lost within the past three weeks—Aurora, Harlem, Tampa, Sibley, St. Lawrence—represent with their cargoes full half a million. The usual list of total losses made up by the Review is not printed in this issue, for the reason that it would probably be incomplete, as there is still a large fleet of vessels moving and the danger of loss is even greater now than it has been at any time during the year.

It must be admitted that the marine insurance problem for next season is much more desperate from the standpoint of the vessel owner than he is willing to admit. This is especially true of the wooden ship. When it is suggested, however, that probably there will be no insurance for wooden vessels, the usual answer of the owner of such vessels is: "Let it come; probably we will be better off, if everybody is placed on the same level." The vessel owner is undoubtedly right in the complaint that the business has been extravagantly managed for a great number of years past, but on the other hand there must be an end to a system of values that admits of 50 per cent. being made in some cases on total losses.

C. A. McDonald of Chicago, who has been conferring with several owners, mainly in Cleveland, on a scheme that contemplates a continuation of interests for next year, is still at work, but with nothing definite in hand as yet. He proposes to bring together a big hull line, which is to include steel and wooden ships, but nothing of lower rating than the A 1½ of Inland Lloyds. The owners of these vessels are to agree on values and to agree also to take, one with the other, 10 per cent. of the entire line of insurance. With this basis of co-insurance, Mr. McDonald is of the opinion that he can go to some of the old companies that have been engaged in lake business and place the entire line at rates ranging from 3½ for steel vessels to 4½ for the wooden vessels; this, with practically the present policy, except that the date of expiration might probably be made Dec. 5, instead of Dec. 12, as at present, and with a clause also making the minimum of loss about \$500 on steel vessels and probably \$300 on wooden vessels. The offer of owners to take even 10 per cent. of the risk may prove a strong argu-

ment, and Mr. McDonald, with a full knowledge of the insurance question, may be confident of his ability to arrange details so as to command the attention of the insurance companies. But the first problem he has in hand is the most difficult one—that of inducing the vessel owners to place confidence enough in him to undertake a radical departure with their interests in his hands.

The Institute of Marine Underwriters, which includes representatives of all the large American companies, as well as underwriters in this country representing English companies, and which was organized during the past summer with a view to improvement in rates, met in New York a few days ago. "Nothing done" was the verdict after the meeting. "The companies did not want to bind themselves to agreements," it was said, "preferring independence of action."

RECEIPTS AND STOCKS OF ORE AT LAKE ERIE PORTS.

Notwithstanding the immense output of ore shown in the foregoing tables, it is found from Lake Erie dock reports that stocks on dock at the close of navigation are 787,348 tons less in the aggregate than they were at this time a year ago. This is certainly an encouraging feature of the situation. One of the ore sales agents, who is always well posted in all matters pertaining to the iron and steel industry, is of the opinion that upon the opening of navigation next spring stocks on Lake Erie docks will not exceed 1,700,000 tons, as against 3,167,915 tons at the opening of navigation this year.

Complete returns from ore dock managers at Lake Erie ports show receipts at these docks for the past season aggregating 11,028,321 gross tons, while the amount on dock with the close of navigation is 5,136,407 tons. The receipts are 907,415 tons in excess of 1897, but as already noted there is a decrease of 787,348 tons in the amount remaining on dock. As shown by figures presented on May 1 of this year there was on dock at Lake Erie ports at the opening of navigation 3,167,915 tons of ore; add to this the receipts during the season just closed, 11,028,321 tons, and we have a total of 14,196,236 tons; deduct 5,136,407 tons, the amount now on dock, and we find that the shipments to furnaces between May 1 and Dec. 1 were 9,059,829 tons, against 7,453,648 tons during the same period in 1897 and 5,021,146 tons during the same period in 1896.

It will be noted that there is a difference of 2,622,467 tons in the shipments from upper lake ports and receipts at Lake Erie ports. This difference represents the ore that was moved by water to South Chicago and other points on Lake Michigan. In 1897 the water shipments to South Chicago and points other than Lake Erie ports, aggregated 2,094,739 tons, and in 1896 they were 1,631,489 tons.

Following are the tables showing receipts at Lake Erie ports and amounts on dock during five years past:

IRON ORE RECEIPTS AT LAKE ERIE PORTS—GROSS TONS.

Ports.	1898	1897	1896	1895	1894
Toledo.....	414,012	416,438	301,794	260,730	158,384
Sandusky.....	136,200	79,792	58,667	12,361	23,043
Huron.....	126,755	198,231	226,515	146,442	172,775
Lorain.....	536,086	355,188	191,445	214,219	150,424
Cleveland.....	2,645,318	2,456,704	2,313,170	2,312,370	1,624,573
Fairport.....	912,879	1,008,340	941,446	914,617	976,222
Ashtabula.....	2,684,563	3,001,914	2,272,822	2,474,791	1,987,722
Conneaut.....	1,404,169	495,327	327,623	244,967	237,905
Erie.....	1,092,364	1,311,526	847,849	811,989	624,438
Buffalo.....	1,075,975	797,446	545,101	719,742	395,339
Tonawanda.....	.....	.....	.....	.....	.....
Total.....	11,028,321	10,120,906	8,026,432	8,112,228	6,350,825

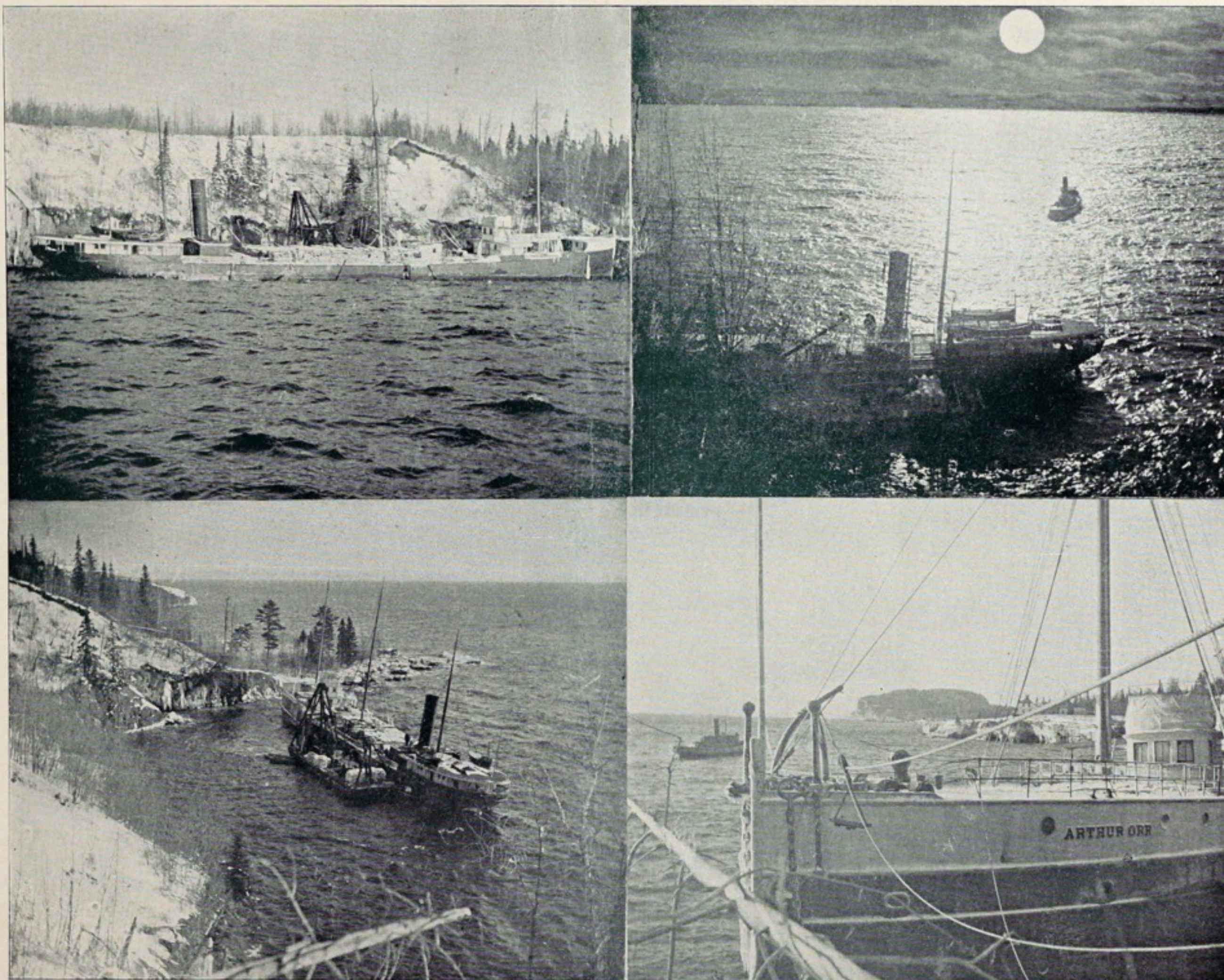
IRON ORE ON LAKE ERIE DOCKS, DEC. 1—GROSS TONS.

Ports.	1898	1897	1896	1895	1893
Toledo.....	146,568	194,644	115,959	113,132	96,157
Sandusky.....	48,500	84,786	59,491	34,375	77,004
Huron.....	139,982	230,029	200,075	101,000	147,632
Lorain.....	324,034	317,509	231,288	224,264	223,733
Cleveland.....	1,175,970	1,478,355	1,419,311	1,200,792	1,441,785
Fairport.....	719,794	825,312	773,905	605,470	660,980
Ashtabula.....	1,732,671	1,835,694	1,441,666	1,301,302	1,439,119
Conneaut.....	288,101	360,895	275,800	292,460	199,365
Erie.....	439,167	484,871	355,222	335,718	454,233
Buffalo.....	121,620	111,660	82,267	207,199	94,239
Total.....	5,136,407	5,923,755	4,954,984	4,415,712	4,834,247

DEATH OF J. TAYLOR GAUSE.

The last issue of the Review contained a brief notice of the death of Mr. J. Taylor Gause, president of the Harlan & Hollingsworth Co. of Wilmington, Del. Mr. Gause was prominently identified with the development of ship building in America. He was born in 1823 and went to Wilmington just twenty years later. He started in a humble position but was gradually advanced from one post to another until in 1858 he was formally admitted as an equal partner in the business with Mr. Harlan and Mr. Hollingsworth, forming the firm of Harlan, Hollingsworth & Co., which was in 1867 merged into the present corporation, the Harlan & Hollingsworth Co. Upon the death of Samuel Harlan in 1883 Mr. Gause assumed the entire management of the business. He retired from the presidency of the company on July 1, 1896, and was succeeded by Henry G. Morse. On August 10, 1898, the resignation of Mr. Morse was announced and Mr. Gause was, a few days later, elected to his old position. Messrs. H. T. and Horace W. Gause, sons of the deceased, are connected with the Harlan & Hollingsworth Co.

Steps have been taken by the Commissioners of customs of Great Britain to arrange for the registration for statistical purposes of all ships built in British yards for foreign owners.



STEEL LAKE FREIGHTER STRANDED ON THE NORTH SHORE OF LAKE SUPERIOR.

VIEWS OF THE CHICAGO STEAMER ARTHUR ORR, ASHORE AT BAPTISM RIVER NOV. 21 TO DEC. 1, 1898.

MECHANICAL STOKERS.

TO BE APPLIED TO WATER-TUBE BOILERS IN MODERN LAKE STEAMERS—TRIAL OF A SUCCESSFUL LAND DEVICE IN GOOD HANDS.

Numerous efforts have been made on the great lakes, as well as in other parts of the country, to apply mechanical stokers to the boilers of steam vessels. The effort has been renewed lately in big steel freight carriers—steamers of 7,000 net tons capacity—built by the Cleveland Ship Building Co. for Mr. A. B. Wolvin, of Duluth. These steamers are fitted with Babcock & Wilcox water tube boilers and quadruple expansion engines. The stoker thus far tried, has not proven successful, but now the American Stoker Co., of Broadway and Liberty street, New York, has become interested in the matter, and it is expected the problem will be solved next season in appliances that will be furnished by this company for large Babcock & Wilcox boilers that are to go into the latest of the Wolvin steamers. The installment calls for six 9-inch American stokers, each provided with an independent motor, and each having two dead grates. Three will be placed under each of the boilers, which are arranged opposite one another, as shown in the transverse section of the ship, Fig. 3. Each group of three stokers is guaranteed

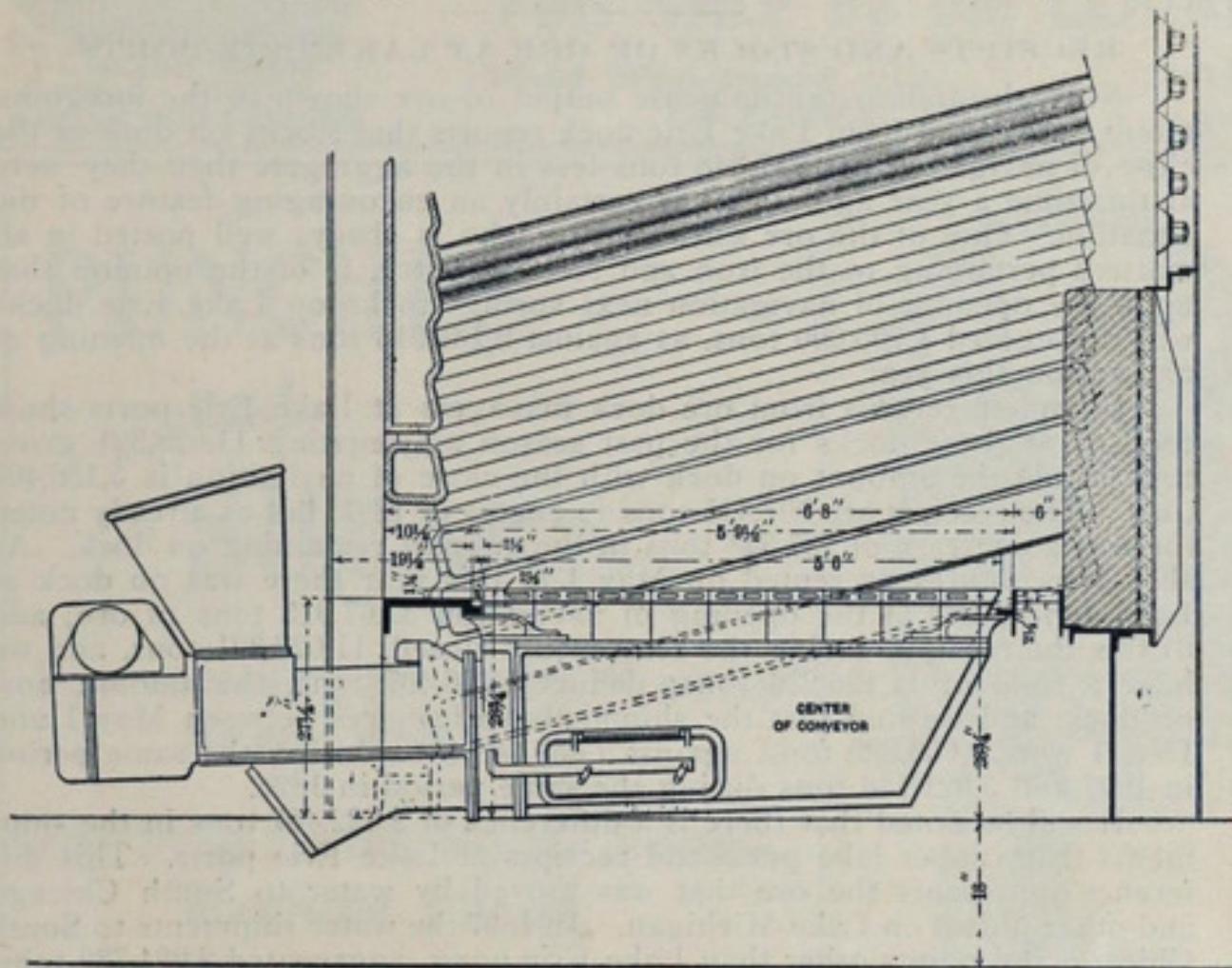


FIG. 1—SECTION FRONT TO REAR.

to burn 1,650 pounds of coal per hour, and 2,100 pounds of coal under forced conditions. Further, the guarantee stipulates that the stack shall be practically smokeless, the only smoke visible being when the fires are being cleaned, or when new fires are being started, or when the fires are being unduly forced. Each group of stokers, as shown in the plan view, Fig. 2, is connected with a blower, which discharges into a duct 34 inches in diameter. This duct leads below the fireroom floor, as shown in Fig. 3, and at each stoker is provided a branch pipe, 12 inches in diameter. Provision is made for hand firing, if for any reason the stoker should become inoperative, through fire doors, indicated by the dotted lines at the left of Fig. 4, which can be opened upon removal of the coal chutes leading to the stokers proper.

These stokers are extremely simple in design, and belong to the under-feeding type. Just in front of the furnace door is a chute, which

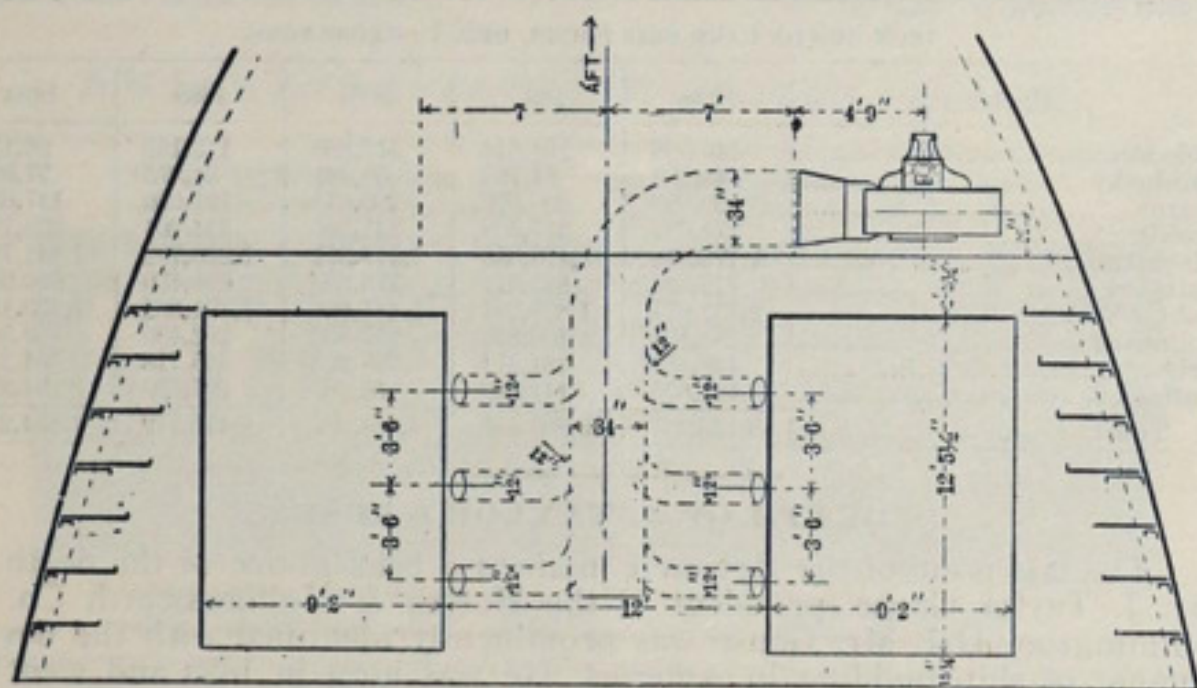


FIG. 2, PLAN SHOWING AIR PASSAGES.

may be fed by hand, as it is in the present case, or mechanically and automatically, as is the case with many installations on shore. In front of this is a small motor, which serves to actuate the screw of a conveyor, which in turn carries the coal into the furnace and distributes it up through the guide chamber to the top of the fire, therefore accounting for its name, "underfeed." This screw conveyor or worm extends the entire length of the furnace. Immediately beneath the conveyor pipe is located the wind box, which in this case is connected with the air conducting pipe from the blower, as indicated in Figs. 1, 2 and 3. The motor driving the worm has a simple reciprocating motion. Its piston rod carries a crosshead, which, by means of suitable connecting links, operates a rocker arm, having a pawl mechanism, which in turn actuates a ratchet wheel attached to the conveyor shaft. The stoker is

thus entirely self contained and complete in itself and consequently there is no danger of the driving and feeding mechanism ever getting out of alignment. This of course is an exceedingly important point in an installation, such as that aboard ship, where there is a constant motion, tending to disarrange any apparatus, the efficiency of which depends upon its correct alignment. The rate of feeding the coal is controlled by the speed of the motor, this being effected by the simple means of

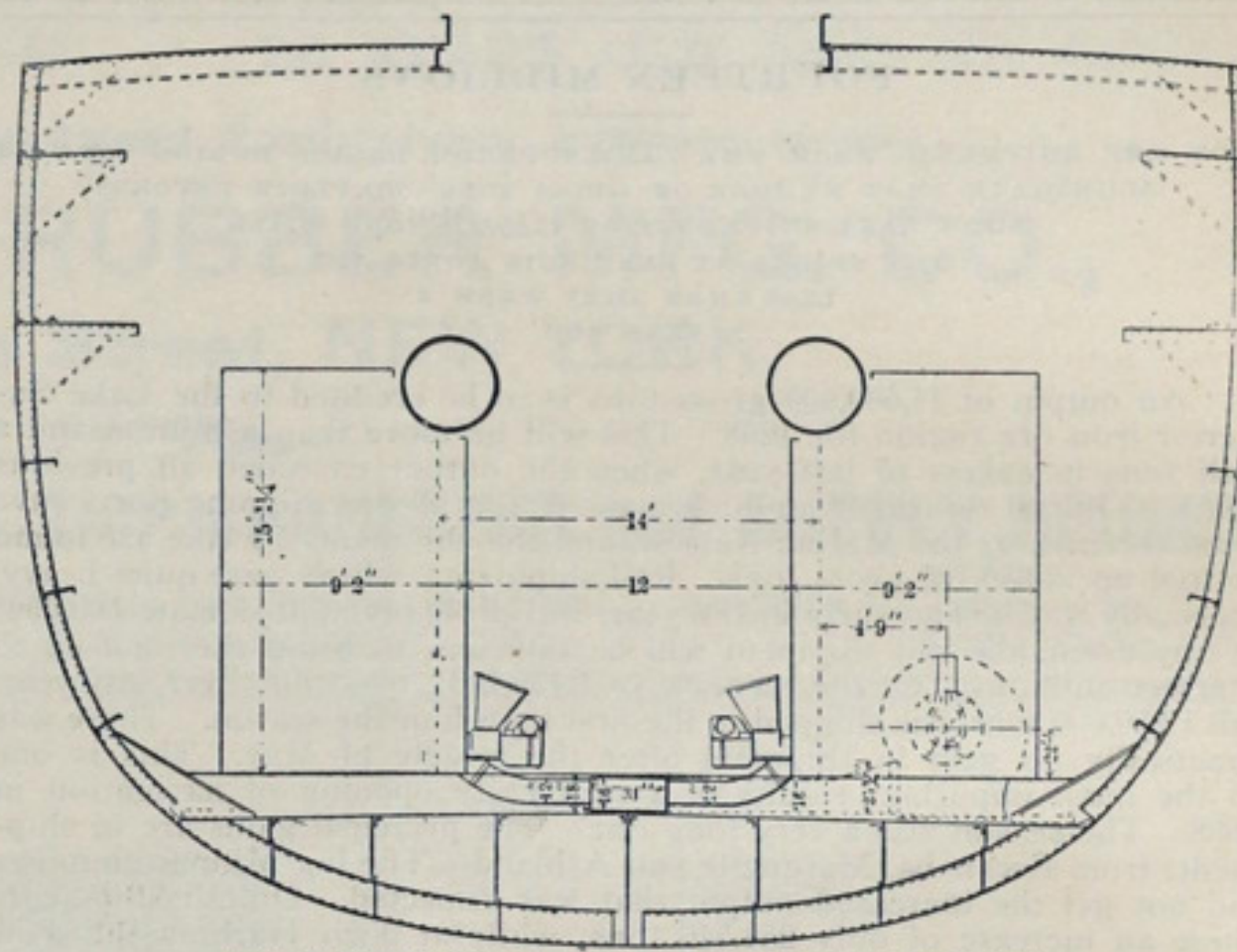


FIG. 3—TRANSVERSE SECTION OF SHIP AT BOILERS.

throttling the steam in the supply pipe to the motor. The motor is effectually protected from dirt and dust.

The coal is fed into the hopper, carried by the conveyor into the magazine or furnace, which it fills, overflows upon both sides, and spreads upon the sides of the grates, as may be understood from the right hand half of the drawing, Fig. 4. The coal is fed slowly and continuously, and approaching the fire in its upward course is slowly roasted and coked, and the gases released from it are taken up by the fresh air entering through the passages, which combines these gases,

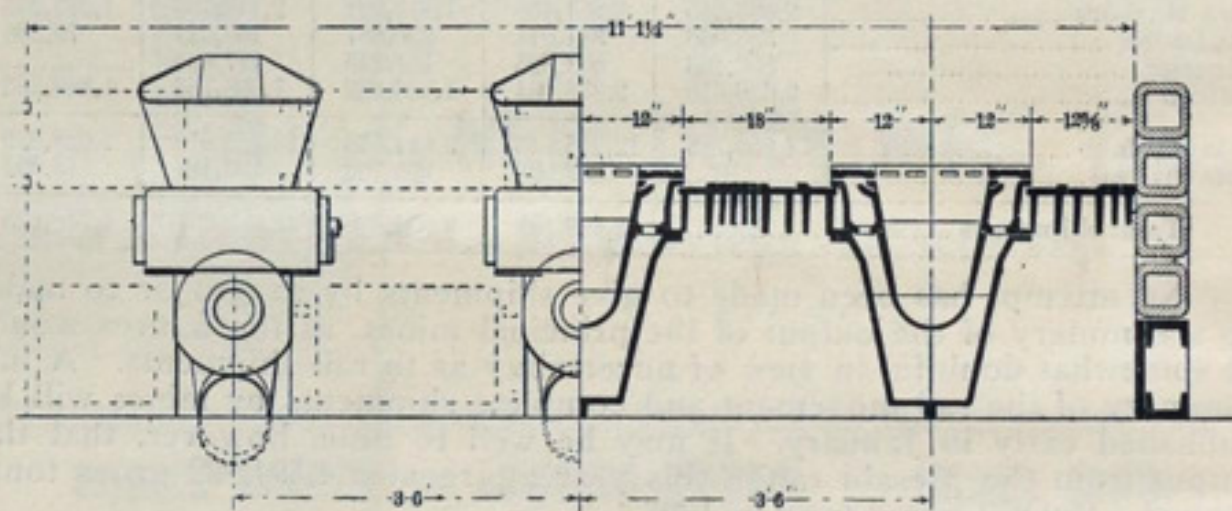


FIG. 4. FRONT ELEVATION AND SECTION.

the coal being delivered as coke on the grates. The continuous feeding gives a breathing motion to this coke bed, thus keeping it open and free to the circulation of air. Every particle of coal entering the hopper passes through this gas making process, and there is no loss of coal through the grates. The cleaning of the grates or the removal of ashes is easily performed and entails no loss whatever, since the coal in its passage has been thoroughly and completely consumed.

BON VOYAGE NOT SOLD.

Messrs. Cook & Co. of Tacoma, Wash., general agents of the Western Steam Navigation Co. (the Vancouver line), write to the Review that they have not, and in all probability will not, secure the great lakes steamer Bon Voyage for service on the Pacific coast. The probability of the transfer being made and the vessel taken around the Horn was mentioned in the Review some weeks ago, when a representative of Cook & Co. visited Duluth for the purpose of negotiating for the vessel. The letter from Cook & Co. is in part as follows: "We were led to believe that the owners of the Bon Voyage had no suitable business for her and that she could be bought very cheap. We found, however, that the Messrs. Howard had a profitable trade for her and that they were disinclined to let her go at a figure that would permit us to go to the expense of bringing her out. If we had taken her we would have steamed her through the canals to the Atlantic, thence via the Straits of Magellan to Tacoma, which we believe would have been entirely practicable." They add that they have now about decided to build a vessel on the Pacific coast.

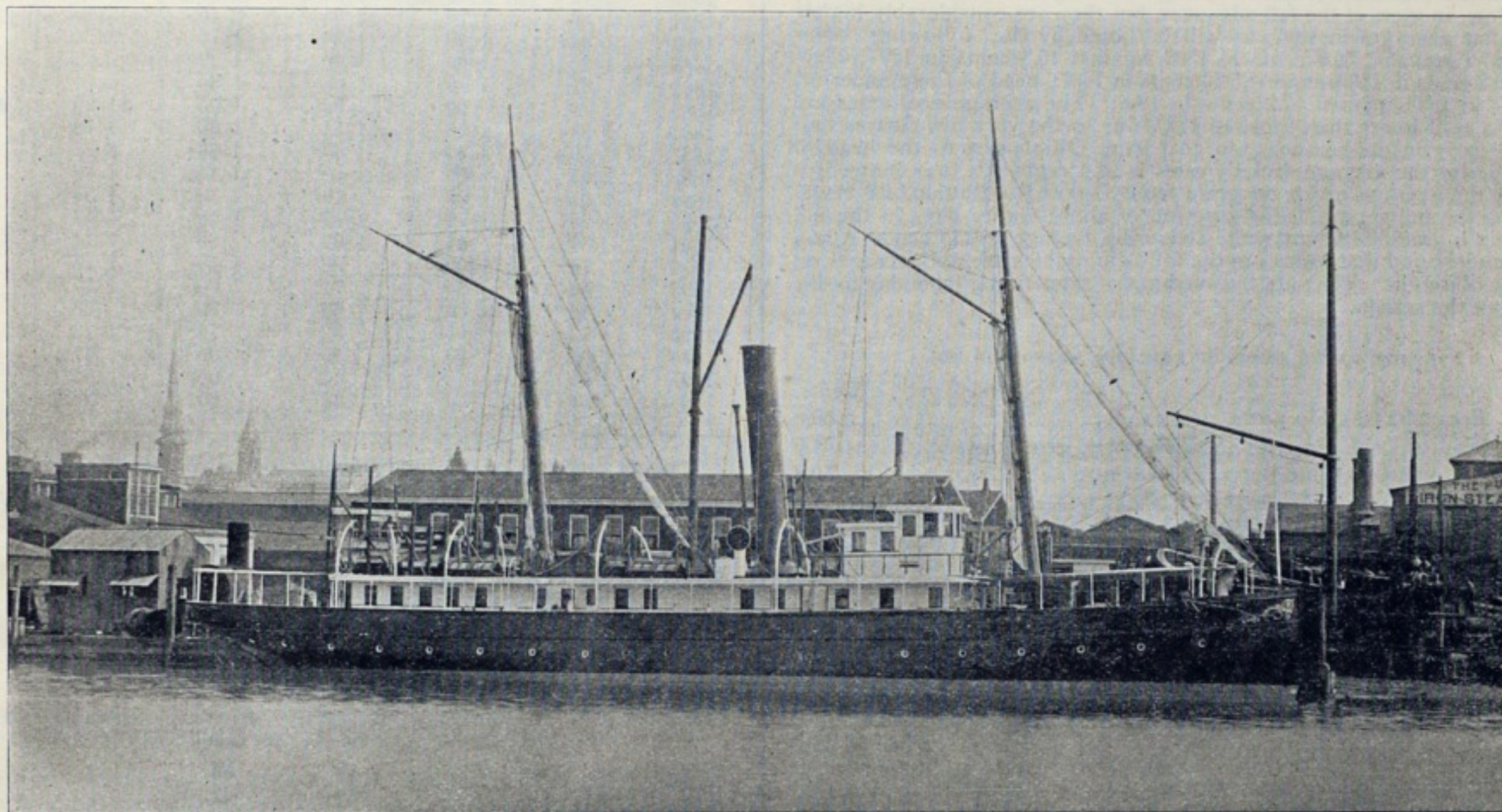
In this connection it may be noted that the Bon Voyage is the subject of a suit recently begun at Duluth by the Howard Transportation Co. to recover \$13,000 from the Rochester, Thousand Island & Ogdensburg Navigation Co. It is set forth that when Messrs. John G. and Benjamin F. Howard purchased the Bon Voyage from the defendant company on Feb. 11 last, the latter guaranteed the Howards that the steamer was in first class condition, fully equipped, and that she could develop a speed of 12 miles an hour, consuming no more than three tons of ordinary ship's coal per one hundred miles. The contention is now made that the boat was not fully equipped, it being necessary to spend \$1,000 to complete her equipment; that her speed does not exceed 11 miles, and that she burns much in excess of three tons of coal per 100 miles. The Howards paid \$22,000 for the steamer and inasmuch as they claim that she is not worth more than \$9,000 they ask reimbursement to the extent of \$13,000.

REVENUE CUTTER MORRILL.

THE VESSEL RECENTLY TRANSFERRED FROM THE ATLANTIC COAST FOR SERVICE ON THE GREAT LAKES—BUILT BY THE PUSEY & JONES CO., OF WILMINGTON, DEL.

When the handsome revenue cutters Gresham, Algonquin and Onondaga, built by the Globe Iron Works Co. of Cleveland, were during the recent war transferred to the Atlantic coast for service in the auxiliary navy, representation of the revenue cutter service on the lakes was reduced to the Fessenden, a vessel inadequate in many respects. To remedy this and with a view also to providing a suitable vessel for St. Mary's river patrol service, the treasury department finally transferred to the lakes, a few weeks since, the revenue cutter Morrill, a vessel which has heretofore been on duty on the Atlantic coast and which saw some war service as a member of the auxiliary fleet. Through the courtesy of the British government the vessel was allowed to pass the St. Lawrence canals with her armament.

The Lot M. Morrill is an iron hull vessel and was built by the Pusey & Jones Co. of Wilmington, Del., in 1889. She is 145 feet 3 inches over all, 133 feet 6 inches between rabbets at load line, 24 feet beam molded, 12 feet 3 inches depth of hold, and 8 feet 6 inches draught. Propelling power is furnished by a fore-and-aft, vertical, compound, surface condensing engine, with cranks set at right angles and cylinders of 24 and 38 inches by 30 inches stroke. The boiler is of the cylindrical, return-tubular type,



U. S. REVENUE CUTTER MORRILL, BUILT BY THE PUSEY & JONES CO., WILMINGTON, DEL.

with circular furnaces, and is 13 feet long and 11 feet 6 inches outer diameter of the inner course. The boiler is supplied with 164 tubes of $3\frac{1}{2}$ inches diameter. Capt. A. B. Davis, formerly of the Fessenden and known throughout the lakes as one of the most efficient officers in the service, is in command of the Morrill.

The Pusey & Jones Co., builders of the Morrill, have just contracted to build for the Port Richmond & Bergen Point Ferry Co. of New York a steel hull side-wheel ferryboat, 140 feet over all, 52 feet beam over guards, 30 feet beam, molded, and 9 feet 11 inches depth. Power will be furnished by an American jet-condensing beam engine, with cylinder of 30 inches diameter and 9 feet stroke. Steam will be supplied from a return-tubular steel boiler. The vessel will be lighted by electricity.

TO HELP LAKE SHIP BUILDING.

An impression is gaining credence that the improvement of the St. Lawrence canals is bound to have a helpful influence on ship building on the great lakes. This expectation is founded on the claim on the part of lake ship builders that they are in position to build certain classes of steel vessels cheaper than they can be turned out at the coast yards. This premise is based solely on mercantile tonnage, and should the Anglo-American commission reach an agreement which will permit the construction of war vessels on the great lakes the prospects will be even brighter. The lake builders claim that even should a depth of 14 feet be unavailable next year throughout entire distance from the Welland to the coast, on account of delay in completing the improvements, the canal will at least be far enough advanced to send to the coast, without cargoes, vessels like the Minneapolis and St. Paul and the steamer now building by the Craig Ship Building Co. of Toledo. Vessels of this kind would be especially suited to Atlantic coast trade. General Manager Besse of the Atlantic Transportation Co. of New York, when he visited the great lakes last autumn to charter boats for coast service, stated that he had upon investigation found that wooden vessels can be built cheaper at lake yards than on the Atlantic coast. If this is true, some wooden vessels may also be built on the lakes for the Atlantic, but it will probably be found that in the coast trade, as in most other lines, wooden ships are a thing of the past.

DECREASE OF CANADIAN MERCHANT MARINE.

That there is no diminution in the percentage of decrease of the Canadian merchant marine is demonstrated by a supplement to the annual report of the department of marine and fisheries, which has just been issued. This report shows that the total number of vessels listed with the department on Jan. 1, 1898, including old and new vessels, sailing vessels, steamers and barges, was 6,684, measuring 731,754 tons register, being a decrease of 595 vessels and a decrease of 57,554 tons register as compared with Jan. 1, 1897. The number of steamers was 1,785, valued at \$21,952,620. The number of new vessels built was 231, valued at \$769,230. For the port of Montreal there is shown a total of 532 vessels, including sailing ships and steamers. Of these 178 are steamers. For Quebec there is shown a register of 882 vessels, of which 120 are steamers. Among the other ports of Canada St. John, N. B., shows a register of 406 vessels, Halifax 472, Ottawa 324, Toronto 226, Victoria, B. C., 213.

LOSSES ON LAKE VESSELS SENT TO THE COAST.

Insurance losses on the lake vessels sent to the Atlantic coast recently will aggregate about \$92,000. Insurance on the steamer Lloyd S. Porter, sunk in the St. Lawrence river and upon which the wreckers are now at work, is \$42,000; on the schooner H. D. Alverson, \$15,000; schooner John O'Neill, \$8,000; schooner Porter, \$15,000, and schooner H. H. Brown, \$12,000. The steamer Porter was owned by the Jenks Ship Building Co. of Port Huron, Mich.; the schooner Porter by Detroit parties; the

schooner Alverson by J. C. Gilchrist of Cleveland; the schooner John O'Neill by C. R. Jones of Cleveland, and the schooner H. H. Brown by the Vulcan Transportation Co. of Detroit. The Brown was abandoned off Booth Bay, Me., in a sinking condition.

The loss of these vessels has occasioned not a little comment in view of the fact that many of them, after they were chartered to the Atlantic Transportation Co., were sent down to the coast with only sticks for masts and without rigging or canvas. It is claimed that they could, in all probability, have weathered the storm had they been provided with sails, which would enable them to care for themselves after being cast adrift. The practice of stripping every bit of rigging and canvas from old vessels when they are put into tows in order to reduce expense accounts and secure a little increase in carrying capacity, is bad enough on the lakes, but here there is usually only one barge behind a steamer, as against three in some of the tows bound for Newport News, and the weather of the Atlantic is, of course, more severe.

FLEET OF THE P. & O. CO.—LARGEST IN THE WORLD.

The annual report of the Peninsular & Oriental Steam Navigation Co., the greatest shipping concern in the world, which was presented at a meeting of the stockholders held recently in London, is a most interesting document. The company's net surplus for the year admits of the payment of $7\frac{1}{2}$ per cent on the paid up capital of \$11,600,000. The P. & O. fleet now consists of fifty-six steamers of an aggregate of 276,103 tons and 286,050 horse power; four steamers building aggregating 28,480 tons and 27,500 horse power, and twenty-nine tenders and tugs aggregating 3,160 tons and 835 horse power. The grand total is thus 307,743 tons. The steamers building are the Assaye and Sobraon, each of 7,240 tons and 6,500 horse power, the Persia of 8,000 tons and 11,000 horse power, and the Banca of 6,000 tons and 3,500 horse power.

German ship builders and naval authorities seem to have given heed to some of the lessons of the naval engagement at Santiago. In order to obviate the danger of fire, owing to the use of wood fittings, orders have been given that all decks and staircases of the new battleship Kaiser Friedrich III shall be entirely of steel.

AVERAGE LAKE FREIGHTS.

ALL ORE FROM THE HEAD OF LAKE SUPERIOR WAS MOVED AT AN AVERAGE OF 59 CENTS A TON—WHEAT FROM CHICAGO TO BUFFALO AT 1.5 CENTS A BUSHEL—WILD RATES ON ORE A LITTLE HIGHER THAN LAST YEAR BUT COAL IS AGAIN LOWER.

The average rate at which all iron ore was moved from the head of Lake Superior during the past season is within a very small fraction of 59 cents. The fraction is so small that it is not worth mentioning. This is the one important item in the general summary of lake freights, on account of the great extent of the ore traffic compared with other branches of the lake trade. This figure does not represent the average of daily rates. It is the average figured on a tonnage basis, representing both wild and contract ore, and was secured through reports from all the ore companies regarding their tonnage and their several averages. A few shippers moved their entire ore output at averages below this figure, in one case (that of a shipper who was finished Nov. 1) at 56 cents. All other figures in the following tables are averages of the rates that ruled from day to day, not tonnage averages. A strange coincidence is found in the daily average rate on wheat from Chicago to Buffalo, 1.5 cents. It is exactly the same as the average during 1897. It will be noted that notwithstanding the high fall ore rates (\$1 a ton was paid on some single trip charters) the tonnage average is considerably lower than last year, due to the large number of 60-cent contracts made early in the spring. Averages of wild rates on ore are also low, in view of the fall advances, but they are considerably higher than similar averages in 1897, as will be noted by the following comparisons: Escanaba, 50.8 cents in 1898, against 45.3 cents in 1897; Marquette, 59.8 cents in 1898, against 54.6 cents in 1897; head of Lake Superior, 61.9 cents in 1898, against 57.2 cents in 1897. The average coal rates are all about a cent lower than those of 1897, due to the very low figures that prevailed early in the season. On coal from Ohio ports to the head of Lake Superior the average of daily rates is 23.4 cents. It may be well to note that the average given on grain from Duluth to Buffalo, 1.8 cents, represents the full season. For a period of about eighty days in the fall when Duluth grain shipments were active the average is 2.78 cents. Again let it be understood that figures in the following tables are not averages on quantities of freight. They are the averages of rates ruling from day to day throughout the season.

AVERAGE DAILY RATES OF FREIGHT, SEASON OF 1898.

	Cents.
Iron ore, Escanaba to Ohio ports, gross ton.....	50.8
Iron ore, head of Lake Superior to Ohio ports, gross ton.....	61.0
Iron ore, Marquette to Ohio ports, gross ton.....	59.8
Wheat, Chicago to Buffalo, bushel.....	1.5
Wheat, Duluth to Buffalo, bushel.....	1.8
Soft coal, Ohio ports to Milwaukee, net ton.....	27.8
Soft coal, Ohio ports to Duluth, net ton.....	23.4
Soft coal, Ohio ports to Portage, net ton.....	29.7
Soft coal, Ohio ports to Manitowoc, net ton.....	28.5
Soft coal, Ohio ports to Sheboygan, net ton.....	27.8
Soft coal, Ohio ports to Green Bay, net ton.....	28.5
Soft coal, Ohio ports to Escanaba, net ton.....	26.4
Hard coal, Buffalo to Milwaukee, net ton.....	28.0
Hard coal, Buffalo to Chicago, net ton.....	28.0
Hard coal, Buffalo to Duluth, net ton.....	23.0

AVERAGE DAILY FREIGHT RATES DURING TEN YEARS ENDING WITH 1898.

	Cents.
Iron ore, head of Lake Superior to Ohio ports, gross ton.....	94
Iron ore, Marquette to Ohio ports, gross ton.....	83
Iron ore, Escanaba to Ohio ports, gross ton.....	67
Soft coal, Ohio ports to Milwaukee, net ton.....	48
Soft coal, Ohio ports to Duluth, net ton.....	38
Hard coal, Buffalo to Chicago, net ton.....	47½
Hard coal, Buffalo to Duluth, net ton.....	31
Wheat, Chicago to Buffalo, bushel.....	02

AVERAGE RATES ON WHEAT PER BUSHEL BY LAKE FROM CHICAGO TO BUFFALO.

Year.	Cents.	Year.	Cents.	Year.	Cents.
1858	3.76	1872	11.46	1886	3.68
1859	5.08	1873	7.62	1887	4.13
1860	9.89	1874	4.03	1888	2.56
1861	11.53	1875	3.42	1889	2.51
1862	10.49	1876	2.90	1890	1.96
1863	7.51	1877	3.72	1891	2.38
1864	9.58	1878	3.07	1892	2.19
1865	9.78	1879	4.74	1893	1.66
1866	12.34	1880	5.76	1894	1.27
1867	6.67	1881	3.44	1895	1.97
1868	7.14	1882	2.50	1896	1.70
1869	6.81	1883	3.41	1897	1.56
1870	5.88	1884	2.18	1898	1.53
1871	7.62	1885	2.02	Average 41 yrs	4.96

Charges to vessels for shoveling, trimming and tallying weights of grain amounted to about \$4.05 per 1,000 bushels in 1897.

RANGE OF LAKE FREIGHT RATES ON WHEAT FROM DULUTH TO BUFFALO.

Year.	Rate, cents.	Year.	Rate, cents.
1898	1.8	1891	1¾@9½
1897	1.75	1890	2 @5
1896	2.12	1889	2 @5
1895	3.50	1888	2 @5
1894	1¼@3	1887	2 @8
1893	1¼@3½	1886	3¼@8
1892	2¼@4	1885	1½@5

1895, 1896, 1897 and 1898 figures represent average of daily rates for full season.

AVERAGE FREIGHT RATES ON IRON ORE PER GROSS TON, FROM PORTS NAMED TO OHIO PORTS—TABLE COVERING WILD AND CONTRACT RATES FOR TWENTY YEARS PAST.

YEAR.	ESCANABA.		MARQUETTE.		ASHLAND AND OTHER PORTS AT THE HEAD OF LAKE SUPERIOR.	
	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.
1879	\$1 25	\$0 90	\$1 83	\$1 40	.....	.....
1880	1 70	1 85	2 26	2 75	.....	.....
1881	1 36	1 75	2 05	2 45	.....	.....
1882	1 04	1 40	1 26	1 75	.....	.....
1883	1 22	1 00	1 40	1 20	.....	.....
1884	87	1 10	1 08	1 35	.....	.....
1885	78	90	98	1 05	\$1 25	\$1 15
1886	1 28	1 05	1 51	1 20	1 78	1 20
1887	1 59	1 40	1 87	1 63	2 23	2 00
1888	1 05	90	1 30	1 15	1 43	1 25
1889	1 01	1 00	1 19	1 10	1 34	1 25
1890	89	1 10	1 07	1 25	1 17	1 35
1891	84	65	1 02	90	1 11	1 00
1892	74	1 00	98	1 15	1 15	1 25
1893	56	85	71	1 00	77	1 00
1894	46	60	60	80	78	80
1895	73	55	92	75	1 13	80
1896	52	70	66	95	77	1 05
1897	45	45	55	65	57	70
1898	51	45	60	60	62	60

Charge to vessel in 1897 for trimming and unloading, 16½ cents a ton.

Average ore rates for the entire period of twenty years: Escanaba, contract 98 cents, wild 94 cents; Marquette, contract \$1.25, wild \$1.19. Average for past ten years: Escanaba, contract 73½ cents, wild 67 cents; Marquette, contract 91½ cents, wild 83 cents; Ashland and other ports at the head of Lake Superior, contract 98 cents, wild 94 cents.

AVERAGES OF DAILY RATES ON SOFT COAL FROM OHIO PORTS TO MILWAUKEE, ESCANABA, DULUTH, GREEN BAY AND MANITOWOC.

Year.	Milwaukee. Cents.	Escanaba. Cents.	Duluth. Cents.	Green Bay. Cents.	Manitowoc. Cents.
1889	54	49	52	.....	.....
1890	64	45	49	.....	.....
1891	61	52	49	.....	.....
1892	58	43	43	55	49
1893	48	40	38	50	41
1894	48½	39	37½	49½	48
1895	54	39	36½	50	51
1896	33½	27	29½	32½	32
1897	28½	29½	26	30	31
1898	28	26½	23	28½	28½
Average, ten years	48	39	38	42	40

Chicago rate about same as Milwaukee.

Coal of all kinds shipped in net tons and handled without charge to vessel.

AVERAGE OF DAILY LAKE FREIGHT RATES ON HARD COAL FROM BUFFALO TO CHICAGO, DULUTH AND TOLEDO DURING TEN YEARS PAST.

Year.	Chicago. Cents.	Duluth. Cents.	Toledo. Cents.
1889	52	41	27
1890	62	43	33
1891	56	29	25
1892	59	43	27
1893	49	29	28
1894	46	25	25
1895	59	24	30
1896	36	24	25
1897	29	26	..
1898	28	23	..
Average for ten years	47½	31	27½

Rate to Milwaukee practically the same as to Chicago, and Detroit rate about the same as Toledo rate.

Hard coal is also net tons and is handled without charge to vessel.

The Pacific Mail Steamship Co. has made overtures to the government looking to the transfer of its mail steamers to American registry on something of the same plan followed when the American line secured register for the steamers Paris and New York.

TEN YEARS IN COURT.

SUCH WILL PROBABLY BE THE LENGTH OF TIME REQUIRED BY A THREE-CORNERED COLLISION CASE—AN EFFORT TO ADVANCE OHIO-MATHER-SIBERIA CASE TO THE SUPREME COURT.

Away back in May, 1890, more than eight years ago, the steamer Ohio was sunk in the St. Mary's river (Mud Lake) by collision with the steamer Siberia. A three-cornered law suit was begun, as it was claimed that the Siberia when she ran into the Ohio was swung from her course by the wrongful approach of the steamer Mather, which was also bound down the river behind the Siberia. In the United States district court (Judge Hammond) all three vessels were held and damages were divided equally between them. Now comes a decision from the United States circuit court of appeals, sixth circuit, in which the case is reversed as to the Ohio, and the Siberia and Mather held for damages and costs, including those of the appeal, which amount in all to about \$60,000. But the matter is not at an end even yet. It is more than probable that an effort will be made on the part of representatives of the Siberia to get the case into the supreme court, and if they are successful ten years will have elapsed between the final settlement and the time of collision.

The Ohio, bound up Mud lake, coal laden and having in tow the schooner Sheldon, came into collision with the Siberia, bound down Mud lake, and was so injured as to almost immediately sink in 33 feet of water. The Siberia was the colliding vessel and sustained but a slight injury. The collision occurred between the can buoy and the entrance of the river into Mud lake. The Ohio sighted the Siberia and Mather just as she was east of and about abreast of the can buoy. The Siberia and Mather had just come out of the river and were distant from the Ohio about two and one-half miles. At that time the Mather was some 400 feet in the wake of the Siberia, and both were about heading on the can buoy. When distant about one-half mile from the Ohio, the latter indicated her intention to pass port to port by a passing signal of one blast. This was replied to by both with like signals of one blast. At that time these boats were about abreast, the Mather having overtaken the Siberia and being in the act of passing on the latter's starboard hand. When these passing signals were exchanged the course of the Siberia and Mather were nearly parallel, the Siberia being headed for the can buoy and the Mather for a "lump" beyond that buoy and slightly to the starboard thereof. They were then running very close together, the weight of evidence being that they were from 40 to 75 feet apart. At the same time the courses of the Ohio and Siberia were such as that if each held its course they would have passed each other at from 600 to 700 feet apart. The Mather was under a speed of about 10 miles per hour and the Siberia at a speed of about 9 miles. The Mather in a short time gained on the Siberia so that she was about one-half of her length in advance of the latter. Just at this point, and when the distance diagonally between the Siberia and Ohio was from 800 to 1,000 feet, the Siberia departed from her course and sheered suddenly to port, and within less than 60 seconds struck the Ohio on her port side, about 50 feet abaft of her stem, making a great hole, through which she filled and rapidly sank.

The district court found that the Siberia was at fault in not reversing so soon as her sheer began, and that it was negligent to experiment with the helm before stopping and backing; that the initial force which started this sheer was the suction of the Mather, which was at fault as an overtaking vessel in not passing the Siberia at a safe distance; that the Ohio was negligent in not stopping and backing so soon as the sheer was discovered.

It was not surprising that this decision was reversed as to the Ohio. Almost everybody connected with the case was disposed to admit that, as the collision occurred within 40 to 60 seconds after the sheer of the Siberia began, there was little time for the master of the Ohio to even think, as against acting in the matter. This was the view taken by the higher court in letting the Ohio out.

The opinion of the circuit court of appeals dealing with the Mather and Siberia is quite lengthy. "It was prepared by Judge Lurton. "It is indisputable," says the court, "that the cause of the collision was the departure of the Siberia from the course she was on when about to pass the Ohio. An agreement to pass port to port had been established. If the Ohio and Siberia had each kept their then respective courses, they would have passed each other at a distance of 600 or 700 feet apart. This establishes a prima facie case of negligence against the Siberia, for this sudden change of course was the immediate cause of the collision. If this swing from her course was caused wholly by the wrongful approach of the Mather, and could not have been prevented or broken before the collision by the use of all the means which were reasonably within the control of those charged with her navigation, she must be acquitted, for the cause of the collision would be a cause not produced by her. But the burden is upon her to show, not only that her sheer was caused by the wrongful conduct of the Mather, but that her own management was such, both before and after the sheer, as not to have contributed to the final collision."

This finding, according to representatives of the Siberia, requires that vessel to show inevitable degree of accident, and it is on this score that an effort will be made to reach the supreme court. It is claimed that the court treats the matter of mismanagement of the Siberia as a suspicion, but still requires that vessel to prove that there was no mismanagement. The court does not actually find the Siberia at fault, according to this claim, but still holds her because she did not prove that she was not at fault.

The Ohio was represented by John Shaw of Detroit and C. E. Kremer of Chicago; the Mather by W. C. Wisner of Detroit and Hoyt, Dustin & Kelley of Cleveland, and the Siberia by Canfield & Canfield of Detroit and Harvey D. Goulder of Cleveland.

Holiday excursion tickets via the Nickel Plate road are on sale Dec. 23, 24, 25, 26, 30 and 31, 1898, Jan. 1 and 2, 1899, and are good returning to and including Jan. 3, 1899. With their splendid train service and low rates the Nickel Plate road adds a pleasing feature to the enjoyment of holiday travel.

275, Dec. 31

BUFFALO'S IMMENSE FLEET.

A SPECTACLE NEVER WITNESSED BEFORE IN THE GRAIN TRADE—CHICAGO WILL BE SHORT OF WINTER STORAGE CAPACITY.

Buffalo, Dec. 13.—There is a spectacle in this harbor just now that was never seen here before, and considering the stress brought to bear on the transportation business by it, there has never been anything like it before in the world. At 7 a. m. today there was afloat in Buffalo harbor 6,236,000 bushels of grain in the following sixty-three vessels:

Thousands.	Thousands.
Arabia..... 32	Adriatic..... 58
Algeria..... 58	Australia..... 215
Amazonas..... 107	Abyssinia..... 118
Barge 107..... 85	Barge 133..... 78
Cuba..... 25	City of Cleveland..... 75
Centurion..... 40	Castalia..... 80
Colgate..... 121	Carnegie..... 200
Empire City..... 197	Fedora..... 95
Fitzgerald..... 50	Griffin..... 100
Genoa..... 25	Grover..... 18
Harper..... 120	Holden..... 223
Hadley..... 85	Italia..... 91
Joliet..... 50	Lackawanna..... 60
Lansing..... 80	Louisiana..... 59
Maricopa..... 50	Maytham..... 120
Maritana..... 100	Sam Mitchell..... 38
Mecosta..... 90	Matoa..... 101
Montana..... 50	Minneapolis..... 125
P. Minch..... 90	Norton..... 180
Naples..... 106	Nicaragua..... 73
Oglebay..... 50	Oades..... 42
Presque Isle..... 141	Paisley..... 56
Penobscot..... 150	Rees..... 160
Russia..... 55	Ramapo..... 116
Rochester..... 59	Rockefeller..... 162
Republic..... 120	Syracuse..... 84
Sacramento..... 83	Superior City..... 230
Tyrone..... 137	Sitka..... 114
Trevor..... 63	Vanderbilt..... 50
Victory..... 174	Vega..... 125
Wilbur..... 65	Yakima..... 96
Yale..... 166	A total of..... 6,236,000

I would be pleased to see this list find a more permanent place of record than the daily press. It was practically all here before the idea of getting out again, at least to lay up, was abandoned. So far as is now contemplated the entire fleet will winter here and there is more to come. The Bar Point ice fleet, now being released at an expense of \$1,000 a day to be paid for the car ferries, numbers some twenty-seven vessels, that have about 2,000,000 bushels more of grain for this port.

As to the time when the fleet will be liberated by unloading no one knows. All that the agents will say is that it will be well into January. Some are loaded for holding, though these mostly belong to the fleet now getting out of the ice. The elevators are doing all they can and so are the roads, but cars have run very short in all branches of business and as soon as they give out there is a stoppage somewhere, of course. We hear of no more threats of demurrage, for it happens that practically all that are loaded here now would have been unable to return to the upper lakes anyhow. Some might have taken coal, but that has been so cut off by the snow storms that it was almost impossible to get the vessels loaded that were chartered. Some were several days about it. There is an abundance of coal now. One dock has 20,000 tons and others report "plenty of it," but it came too late.

The situation insures a fleet to winter here that was never known before, especially as to individual size. There will be about seventeen of the Minnesota and American Steel Barge fleets. Davidson will have more than a dozen, and all of the Zenith City boats will be here. It will make winter storage in Chicago high, and it is going to be a hard task to find dock room enough for the vessels here.

This morning the insurance agents took alarm. They had been asked to cover the floating cargoes, and they said that if a fire should break out in the harbor it would swamp some of the companies. A move was made to urge the fire department to set up a special patrol or in some way make sure that all possible precaution is taken.

JOHN CHAMBERLIN.

There is absolutely no truth in reports from West Bay City about F. W. Wheeler having ships to build. He is working very earnestly on the difficult task of trying to buy up the ship yard bonds on credit, and it is understood he has secured about half the issue at prices in some cases as low as 20 cents on the dollar. It is also understood that he has succeeded in inducing nearly all of the numerous creditors who brought suit against the Rockefeller ships to withdraw their claims. He is being helped in this, of course, by the Bessemer company, and it would seem, in fact, that the opening of the ship yard is entirely dependent upon these claims being wiped out, as Wheeler evidently has some kind of a promise from Mr. Rockefeller's representatives of a contract with which to begin work if all suits against the Bessemer boats are withdrawn. The promise, of whatever kind it may be, evidently includes also the withdrawal of the large claims which the Bessemer company holds against Wheeler & Co. Under these circumstances, the yard when opened will undoubtedly be under the control of Wheeler personally and not the firm of F. W. Wheeler & Co.

Officials of the navy department have decided that all torpedo boats now building on the Atlantic coast, or which have already been built, but have not had their governmental trials, shall be speeded over a course on the lower Delaware river.

Commodore George W. Melville, engineer in chief of the United States navy, has been elected to the presidency of the Society of Mechanical Engineers.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by John M. Mulrooney.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

Shipping interests throughout the world should endorse the suggestion made by President McKinley in his last message to congress, that action be taken with a view to securing the exemption from capture during war of all private property on the high seas. It is only a few days since the New York Chamber of Commerce passed resolutions favoring a movement in that direction. President McKinley's declaration on the subject is as follows: "The experience of the last year bring forcibly home to us a sense of the burdens and the waste of war. We desire, in common with most civilized nations, to reduce to the lowest possible point the damage sustained in time of war by peaceful trade and commerce. It is true we may suffer in such cases less than other communities, but all nations are damaged more or less by the state of uneasiness and apprehension in which an outbreak of hostilities throws the entire commercial world. It should be our object, therefore, to minimize, so far as practicable, this inevitable loss and disturbance. This purpose can probably best be accomplished by an international agreement to regard all private property at sea as exempt from capture or destruction by the forces of belligerent powers. The United States government has for many years advocated this humane and beneficent principle, and is now in position to recommend it to other powers without selfish motives. I therefore suggest for your consideration that the executive be authorized to correspond with the governments of the principal maritime powers with a view of incorporating into the permanent law of civilized nations the principle of the exemption of all private property at sea, not contraband of war, from capture or destruction by belligerent powers."

It is ridiculous to talk of the United States offering anything to Canada in return for the removal of canal tolls on the Welland and St. Lawrence. Lake interests have asked for a removal of these tolls simply with a view to retaining all the business it is possible to hold to lake routes. New York, Baltimore and any other eastern seaports that would be injured by an increase of exports through Canada's canals and by way of Montreal, are, of course, opposed to our government suggesting the removal of these tolls. Canada must eventually remove the tolls if business is to be secured for her canals, even after the enlargement of the St. Lawrence waterways. These canals have practically no business now in comparison with the several lake and rail routes in the United States. Lake interests have advocated the removal of tolls for the reason that they are desirous of having all lake routes present the lowest possible transportation charges. There will be no great disappointment if the tolls are not removed as a result of the deliberations of the Anglo-American commission. They must be abolished later on. Canada is standing in her own light in not abolishing them. But transportation matters in Canada have been handled in a strange way for some time past. Not long ago the owners of the Parry Sound railway, that has demoralized Welland canal business this year, got the ear of the government and secured a subsidy for a railway that was to kill the government's canal business. Now the influence of this same railway will undoubtedly be used to retain the canal tolls.

Mr. Theodore C. Search, of Philadelphia, president of the National Association of Manufacturers, who has been one of the most ardent advocates of legislation for the benefit of American shipping announces that the manufacturers of the United States are much gratified by the particular emphasis with which the needs of the American merchant marine have been pointed out in the annual message of the president, and in the annual reports of the secretary of the treasury and the post-master general. "The manufacturers of the United States are," he says, "deeply concerned in this matter. They are the shippers of a constantly increasing share of the country's exports—nearly \$300,000,000 worth in the last fiscal year—and they will gladly give their vigorous support to any shipping legislation which will provide equitably for all interests concerned. The National Association of Manufacturers has always stood for an American merchant fleet, and has been closely identified with all important steps that have been taken in that direction since the formation of the organization. The members of this association will watch with the closest interest the course of legislation bearing upon shipping matters, and will be ready to do their share in the work of shaping measures to accomplish the desired ends."

REMARKABLE RECORD IN SHIP BUILDING.

A computation just made shows that Harland & Wolff of Belfast, Ireland, who for six or seven years have stood at the head of the list of the ship builders of the world, will this year have launched nearly 70,000 tons, made up of seven large steamers. All of the vessels are twin screws and are as follows: New England, 11,394 tons and 7,800 horse power; Statendam, 10,320 tons and 6,300 horse power; Bay State, 6,824 tons and 4,200 horse power; German, 6,763 tons and 2,750 horse power; Manhattan, 8,004 tons and 2,700 horse power; Afric, 12,300 tons and 5,100 horse power; Medic, 12,300 tons and 5,100 horse power. The Afric and Medic have quadruple expansion engines, while the remainder are fitted with triple expansion engines, although the engines of the New England have four cylinders. The aggregate is 67,905 tons and 34,950 horse power, and but for unforeseen circumstances connected with the weather the above list would have been increased by the addition of a vessel of 10,950 tons and 4,400 horse power. The White Star liner Oceanic, the largest vessel ever constructed, building by the same firm, will be launched Jan. 14.

RECENT BOOKS.

"The Book of the Ocean" by Ernest Ingersoll, which has lately come from press, is one of the most admirable books imaginable for readers who are not thoroughly conversant with maritime or naval matters, but who are inclined to the fascinations of the sea and the ship. The whole subject suggested by the title has been treated in a comprehensive manner. The ocean and its origin is first taken up, and after this follow chapters on waves, tides and currents, the building and rigging of ships, war ships and naval battles in all ages, the mercantile marine, yachting and pleasure boating, and finally coming down to a consideration of fishing and other marine industries. The volume is a magnificent one typographically, being embellished with a handsome decorative cover and containing several hundred illustrations, most of them from photographs or sketched from life. The author has a clear, forceful style and a manifest familiarity with his subject.

Published by the Century Co., Union Square, New York City.

It is a safe prediction that few books issued with reference to the late war will possess a keener interest for naval men than "With Dewey at Manila," which has just made its appearance on the book shelves. It is aptly termed the "plain story of the victory, as related in the notes and correspondence of an officer on board the flagship Olympia." It has been edited by Thomas J. Vivian, who has done his work well. The descriptions have the advantage of being personal observations, and the report of the remarks and actions of Admiral Dewey during the engagement constitute an interesting sidelight upon his character. There has been some discussion of the technical side of the subject and at one point it is stated: "There is no better place, too, in which to mention another fact, this: That we were moving down on the enemy's base; that our defeat meant being 6,000 miles away from supplies or succor; while to the Spaniards defeat meant an easy falling back on a port of relief. I say this because since the victory at Manila I have seen a number of criticisms whose tenor has been to minimize the victory on the ground of the disparity between fighting machines." The book is handsomely illustrated with photos of the ships of Dewey's squadron and their commanders.

Published by R. F. Fenno & Co., 9 and 11 East 16th street, New York City.

EXPERIMENTAL TANK AT GLASGOW.

Prof. Biles of the naval architecture chair at Glasgow university has evidently watched with considerable interest the efforts of naval architects in this country to secure the establishment of experimental tanks for trials with models of ships. After a long struggle, the necessary appliances for this purpose have been provided at Cornell university, and through the efforts of Chief Constructor Hichborn of the United States navy the government has also established at the Washington navy yard an experimental tank that is probably the finest in the world, and which is accessible to the builders of merchant ships. Now it is announced that Prof. Biles is engaged in an effort to secure the establishment of a similar tank for the instruction of students at the Glasgow school. In a recent address Prof. Biles declared that practically all the apparatus in the naval architecture department of the Glasgow school at the present time consists of drawing boards and calculating machines. The naval architect, he declared, needs the benefit of the very best apparatus that can be procured, for the reason that he requires a knowledge of structural details at least of as high an order as that of the civil engineer, of engines and boilers second only to that of the marine engineer and also an acquaintance with the internal arrangement which will best facilitate the economical working of a ship. Moreover he must be familiar with the laws of flotation, stability, resistance to forward motion, oscillations and in fact everything which effects the completed ship. He stated that it would cost probably \$75,000 to provide the tank and apparatus and an additional \$50,000 to endow it with a permanent staff.

WORK ON THE ST. LAWRENCE CANALS.

As has been stated in previous issues of the Review, officials in charge of the enlargement of the St. Lawrence canal locks to Welland canal size, and their deepening to 14 feet, have seemed all along rather disinclined to give out information as to progress of the work, beyond the assurance that it would be completed in 1899, but occasionally partial reports are available from private sources. It is claimed that the work is progressing in a fairly satisfactory manner along the whole line of improvement. At Cardinal, W. Davis & Sons have a job of excavation under way that involves the largest cut, so far as area is concerned, to be found in any canal on the continent, there being almost 2,000,000 yards in the contract. The length from the point where the cut leaves the old canal below the town to where it re-enters above is exactly one and one-third miles. Employed in the work on this portion of the canal are four steam shovels, nine locomotives, a large number of horses and from 600 to 700 men. Electric light is provided from end to end, so that the work of excavation is carried on night and day. The contractors operate about fifteen miles of railroad track, and the earth is dumped two and a half miles below the cut. The locomotives average about twenty-eight trips every twenty-four hours.

IMPROVEMENTS AT THE SAULT.

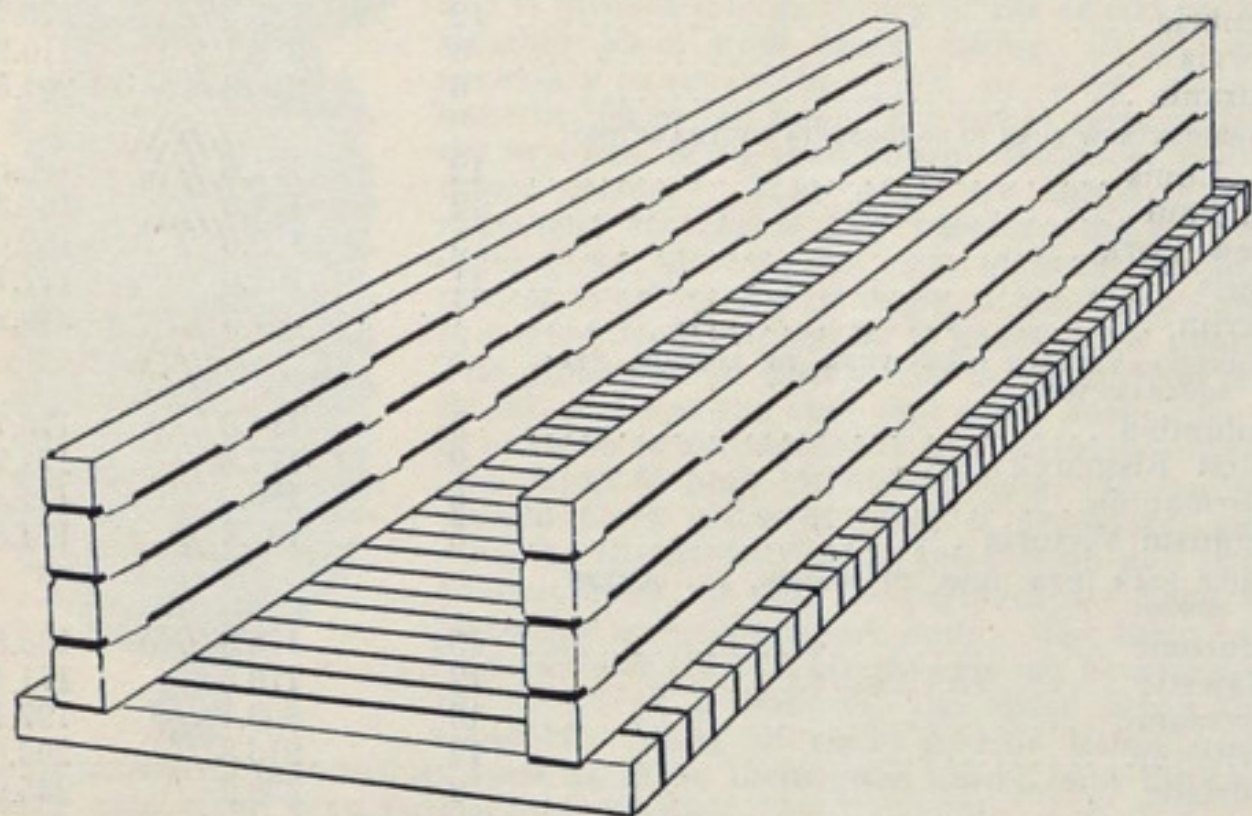
Preparations are in progress at the Sault Ste. Marie canal for improvements that will be made during the winter. The principal work mapped out for the winter is the extension of the northeast pier at the canal, and excavating to the approach of the Weitzel lock. The lower gates at the Weitzel lock will be replaced by new ones, which are expected to be in place and ready for the opening of navigation next year. The flooring of the Poe lock will receive additional bolts and rods, and the cylinders of the engines used for operating the Weitzel lock will be re-bored. A number of changes and improvements to both locks are contemplated, but have not as yet been definitely decided upon. The greater portion of the work will be done by the regular canal employees.

NOVEL TYPE OF DRY DOCK.

FORM OF FLOATING DOCK DESIGNED BY WILLIAM GOLDING, OF NEW ORLEANS, LA.—A COMBINATION OF LARGE PONTOONS.

The distinction of novelty must assuredly be accorded to a type of floating dry docks designed by William Golding of New Orleans, La., and which is illustrated herewith. The main feature of the plan is the assembling of a number of steel pontoons, aggregating adequate lifting capacity and secured in such a manner as to form a solid structure, while still permitting the removal of each pontoon for painting and repairs. The plan of the dock is thus outlined by its inventor:

"For a dock of this type capable of lifting 12,000 tons the length will be 500 feet and the inside width 80 feet. There will be forty pontoons placed side by side, yet $2\frac{1}{2}$ feet apart, each 10 feet wide by 12 feet deep, and 120 feet long. There will be eight submerging tanks, constructed precisely the same as the pontoons, which will be placed one upon the other as shown, yet being separated by I bars to facilitate painting. These tanks will be 500 feet long by 10 feet square each. When the pontoons and submerging tanks are placed in the position shown in the sketch they will be



THE GOLDING TYPE OF DRY DOCK.

secured by suitable stirrups, which will pass entirely around each pontoon and extend to the top submerging tank, thus securing and combining the pontoons and submerging tanks as one structure. The pontoons will be divided into three compartments, each 40 feet long. To sink the dock water will be admitted into the two end compartments, the center compartments being barely sufficient in the aggregate to balance the entire weight of the dock. When the pontoons are filled water will gradually flow into the submerging tank through suitable controlling valves, which will be closed when the required depth is reached. For removing the water from the pontoons there will be placed on the outside ends of same eighty pumps of proper type and size. These pumps will be operated in four sets of twenty each, on one shaft, at each quarter of the dock. The motive power will be electricity supplied from a power house conveniently located on land. No water will be admitted to either of the top tanks, in which there will be sufficient reserve to float the entire dock, even should all the valves be left open. The objects sought to be gained in this type of dock construction are economy of construction, simplicity in operation, facility of preservation and absolute safety. Total weight of material is 6,000 tons, net lifting capacity 12,000 tons, gross lifting capacity 18,000 tons. It is estimated that a dock of this type and capacity can be constructed and set up ready for operating for the sum of \$400,000."

In a letter to Capt. Geo. P. McKay, of the Lake Carriers' Association, Commander C. O. Allibone, inspector of the ninth light-house district (Lake Michigan), says the work of establishing steam fog signals at Calumet (South Chicago), Grand Traverse and Muskegon, and a light and signal on the crib at Racine Reef will be begun early in the coming year. Commander Allibone also refers to the report furnished him some time ago by the captain of the steamer Victory, after that vessel had suffered extensive damage by striking bottom while on a Lake Michigan voyage. He says: "I made three trials to find the obstruction reported by the master of the Steamer Victory. I sounded on lines running between Lansing shoal gas buoy and Squaw island shoal buoy, but did not find any shoal water. At Beaver island harbor I sent for two fishermen, captains and owners of fishing tugs, who have for a long time fished on and about Lansing shoal. They informed me that they have never found shoal water, rocks, or boulders at or near the position of the obstruction as given by the master of the Victory. It is a fact that the Victory struck an obstruction, and I assure you that I will make every effort to find it. I have the promise of the fishermen that they will look for it, and will promptly inform me of any newly discovered shoal or obstruction. I gave them each the latest chart of the Straits of Mackinac. The fact that the assistance of the fishermen, who not only cast their nets on the shoals, but who sound continually on their fishing grounds, is cheerfully promised, together with my intention of going carefully over the localities of suspected dangers, will give us a better knowledge of the navigable passages, etc., of the lake. I intend to interest all fishermen in this district to look out for and report any shoal, rock, etc., that they may find."

The magnificent steam yacht which Messrs. G. L. Watson & Co., naval architects of Glasgow, have designed for A. J. Drexel, the New York banker, will be built by Messrs. Scott & Co., Greenock. She will be 268 feet over all, 36 feet beam, 20 feet depth and of 1,810 tons, and will have twin screws developing 5,000 horse power and calculated to give her a speed of 17 knots.

CONTRACTS LET AND PENDING.

LATEST NEWS REGARDING NEW BUSINESS IN SHIP YARDS ALL OVER THE COUNTRY—NEW INCORPORATIONS AND IMPROVEMENTS AT OLD PLANTS.

The Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, of Morris Heights, N. Y., has the contract to furnish to the war department eight steam launches for use on the transports Mohawk, Mobile, Massachusetts, Manitoba, Mississippi, Michigan, Minnewaska and Chester. These launches are 30 feet long, 8 feet beam and 3 feet draught. They are fitted with fore-and-aft compound engines, with cylinders 4 inches and 8 inches in diameter and 7 inch stroke and Seabury water tube boilers. They will have a speed of nine miles an hour.

The Neafie & Levy Co., Philadelphia, Pa., has launched the steel seagoing tug Swatara building for the Philadelphia & Reading Railroad Co. She is 170 feet over all, 29 feet beam and 18 feet depth and is fitted with triple expansion engines with cylinders 18, 28 and 45 inches by 30 inches stroke. Steam will be supplied from two Scotch boilers each 12 feet by 12 feet 6 inches capable of a steam pressure of 165 pounds.

The four-masted schooner John C. Haynes, recently launched by Washburn Bros., of Thomaston, Me., is 201 feet keel, 41 feet beam, 19 feet depth and of 1,200 registered tonnage. She is equipped with a 20-horse power engine, built by Rossen & Morrison of Cambridgeport, Mass.; a Knowlton Bros. patent steam windlass and a 6-inch Dean wrecking pump.

Lieut. Col. M. B. Adams, U. S. engineer at Detroit, has received bids for furnishing two sets of boilers, machinery, etc., for four steam fog signals as follows: Fulton Iron & Engine Works, Detroit, \$4,496; D. Connelly, Cleveland, \$4,634; John P. McGuire, Cleveland, \$4,950; Thomson Kingsford, Oswego, N. Y., \$9,299; James Clark Co., Baltimore, Md., \$11,966.

A. G. Cuthbert, naval architect and yacht builder, has leased the property on the Calumet river just east of the Ninety-second street bridge, Chicago, and will establish thereon a modern yacht building plant. He has already booked several orders, among others the contract for the construction of the challenger for the Canadian cup.

The Manhattan Dry Dock Construction Co., principal office New York city, was incorporated last week to build, repair, sell and operate ships, vessels, etc. Authorized capital, \$5,000,000; subscribed capital, \$1,000; paid in \$100. Incorporators, C. F. Peck, J. A. McDuffie, W. A. Davis, G. H. Smith and W. H. Brower, all of New York city.

The Toledo & Ann Arbor Railroad Co., for which the Globe Iron Works Co., Cleveland, recently completed a car ferry, will, it is understood, next season contract for the construction of a powerful steel tug to maintain an open channel between Menominee, Mich., and the Sturgeon Bay canal.

The New England Co., Bath, Me., has launched another of the barges, building for the Consolidated Coal Co. of Baltimore, Md. The vessel measures 193 feet over all, 35 feet beam, 17 feet depth and is of 898 tons gross or 790 tons net register.

The steam yacht Impatient, owned by William H. Jackson, Salisbury, Md., has just been thoroughly overhauled and repaired at the works of the E. J. Codd Co., Baltimore, Md., and has been fitted with a Roberts water tube boiler.

Arthur Sewall & Co., Bath, Me., will be ready early in January to launch the four-masted steel schooner under construction at their yard and the keel for another similar ship will be laid almost immediately thereafter.

Bids opened by George A. Zinn, U. S. engineer at Louisville, Ky., for the construction of a steam tender were as follows: E. J. Howard, Jeffersonville, Ind., \$3,025; the Charles Barnes Co., Cincinnati, \$2,975.

It is rumored that General E. N. Whitlock will have a steam yacht built similar to the Hildegard and that plans will be furnished by H. C. Wintringham, naval architect, Havemeyer building, New York city.

The steamer Pathfinder, building for the United States coast survey and recently fully described and illustrated in the Review, was launched last week at the Crescent ship yard of Lewis Nixon, Elizabeth, N. J.

The Upper Yukon Co., of which F. H. Kilbourne of Seattle, Wash., is president, will next year build (probably at Seattle) three 100-ton river steamers, which will cost in the neighborhood of \$30,000 each.

The R. M. Spedden Co., Baltimore, Md., will build for Norfolk, Va., parties a wooden tug 90 feet in length, 20 feet beam and 10 feet depth of hold. Types of engines and boiler have not yet been determined.

The New England Co., Bath, Me., has secured the contract for the construction of two barges 200 feet long, 35 feet beam and 17 feet depth. They are to be completed in April.

A contract has been awarded to Capt. E. W. Visger, Alexandria Bay, N. Y., for the construction of docks along the St. Lawrence river, comprising the international park.

The Lockwood Mfg. Co., East Boston, Mass., in addition to building the machinery for the new Boston ferryboat have on hand contracts aggregating \$100,000.

The Union Towboat Co., Boston, Mass., has awarded to the Atlantic Works, East Boston, Mass., the contract for two tugs, each of 110 feet keel.

J. Pierpont Morgan's new yacht, the Corsair, was launched this week at the yard of T. S. Marvel & Co., Newburg, N. Y.

A new design in steamship propellers has been made by an Englishman. The blades are arranged in two pairs, one pair pointing aft in the usual manner, while the other pair inclines forward. The object of the design, as described by the inventor, is for "the blades to obtain a proper grip of the water, as each has a solid body of water in front of it." The same action takes place on the reverse motion. It is claimed that the advantages of a two-bladed propeller are thus obtained, accompanied by the steadiness resulting from the use of a larger number of blades. The principle can also be applied to a three-bladed propeller.

CLASS OF VESSELS TO BUILD.

CAPT. A. T. MAHAN DISCUSSES THE QUESTION IN THE LIGHT OF THE DEMANDS TO BE MADE UPON THE UNITED STATES NAVY BY NEW CONDITIONS.

Capt. A. T. Mahan is devoting quite a little attention to that foundational factor, the ships themselves, in the series of articles on "The War on the Sea and Its Lessons," which he is contributing to McClure's Magazine. Referring, in the December number of the magazine, to the proportionate excess of war vessels necessary to successfully blockade other war vessels, in connection with the circumstance that Admiral Sampson's armored ships numbered seven to Cervera's four, he says:

"The circumstance possesses a further most practical present interest, from its bearing upon the question between numbers and individual size in the organization of the naval line of battle; for the ever importunate demand for increase in dimensions, in the single ship, is already upon the United States navy, and to it no logical, no simply rational, limit has yet been set. This question may be stated as follows: A country can, or will, pay only so much for its war fleet. That amount of money means so much aggregate tonnage. How shall that tonnage be allotted? And especially how shall the total tonnage invested in armored ships be divided? Will you have a few very big ships or more numerous medium ships? Where will you strike your mean between numbers and individual size? You cannot have both unless your purse is unlimited. The Santiago incident, alike in the battle, in the preceding blockade and in the concurrent necessity of sending battleships to Dewey, illustrates various phases of the argument in favor of numbers, as against extremes of individual size. Heavier ships were not needed; fewer ships might have allowed some enemy to escape; the Massachusetts and the New York both being necessarily though temporarily absent, would, had the ships been bigger and fewer, have taken much more proportionately from the entire squadron. Above all, had that aggregate, 65,934 of tonnage in seven ships, been divided among five only of 13,000 each, I know not how the two ships that were designated to go with Watson to the Philippines could possibly have sailed.

"The question is momentous and claims intelligent and immediate decision, for tonnage once locked up in a built ship cannot be got out and redistributed to meet the call of the moment. Neither may men evade a definite conclusion by saying that they will have both unlimited power—namely, size—and unlimited number; for this they cannot have. A decision must be reached and upon it purpose must be concentrated unwaveringly; the disadvantages as well as the advantages of the choice must be accepted with singleness of mind. Individual size is needed for specific reasons, numbers also are necessary. Between the two opposing demands there is doubtless a mean of individual size which will insure the maximum offensive power of the fleet; for that and not the maximum power of the single ship is the true object of battleship construction. Battleships in all ages are meant to act together in fleets, not singly as mere cruisers.

"A full discussion of all the considerations on one side or the other of this question would demand more space than the scope of these papers permits. As with most conclusions of a concrete character dealing with contradictory elements the result reached will inevitably be rather an approximation than an absolute demonstrable certainty; a broad general statement, not a narrow formula. All rules of war, which is not an exact science, but an art, have this characteristic. They do not tell one exactly how to do right, but they give warning when a step is being contemplated which the experience of ages asserts to be wrong. To an instructed mind they cry silently: 'Despite all plausible arguments this one element involved in that which you are thinking to do shows that in it you will go wrong.' In the judgment of the writer two conditions must be primarily considered in determining a class of battleship to which, for the sake of homogeneity, most of the fleet should conform. Of these two one must be given in general terms, the other can be stated with more precision. The chief requisite to be kept in view in the battleship is the offensive power of the fleet of which it is a member. The aggregate gunpower of the fleet remaining the same, the increase of its numbers, by limiting the size of the individual ships, tends up to a certain point, to increase its offensive power, for war depends largely upon combination, and facility of combination increases with numbers. Numbers therefore mean increase of offensive power, other things remaining equal. I do not quote in defense of this position Nelson's saying that 'numbers only can annihilate,' because in his day experience had determined a certain mean size of working battleship, and he probably meant merely that preponderant numbers of that type were necessary, but weight may justly be laid upon the fact that our forerunners had under the test of experience accepted a certain working mean and had rejected those above and below that mean save for exceptional uses.

"The second requisite to be fulfilled in the battleship is known technically as coal endurance—ability to steam a certain distance without recoaling, allowing in the calculation a reasonable margin of safety, as in all designs. This standard distance should be the greatest that separates two coaling places as they exist in the scheme of fortified coaling ports which every naval nation should frame for itself. In our own case under evident future conditions, such distance would be that from Honolulu to Guam, in the Ladrone—3,500 miles. The excellent results obtained from our vessels already in commission, embodying as they do the tentative experiences of other countries, as well as the reflective powers of our own designers, make it antecedently probable that 10,000 and 12,000 tons represent the extremes of normal displacement advantageous for the United States battleship. When this limit is exceeded observation of foreign navies goes to show that the numbers of the fleet will be diminished and its aggregate gunpower not increased—that is, ships of 15,000 tons actually have little more gunpower than those of 10,000. Both results are deviations from the ideal of the battle fleet already given. In the United States navy the tendency to huge ships needs to be particularly watched, for we have a tradition in their favor, inherited from the successes of our heavy frigates in the early years of this century. It must be recalled therefore that those ships were meant to act singly, but that long experience has shown that for fleet operations a mean of size gives greater aggregate efficiency, both in force and in precision of maneuver. In the battleship great speed is distinctly secondary to offensive power and to coal endurance."

RECORDS OF TRANSATLANTIC STEAMERS.

Compilation has just been made of the records of the principal transatlantic steamers for the year ending in June last. The number of hours given does not indicate merely the time occupied by the voyage, but the elapsed time between the collection of mails at the New York postoffice and their delivery at postoffice at Paris or London.

LINE AND STEAMER.	NUMBER OF TRIPS.	AVERAGE TIME OCCUPIED PER TRIP, HOURS.	QUICKEST TRIP, HOURS.
NORTH GERMAN LLOYD (NEW YORK TO LONDON, VIA SOUTHAMPTON):			
Kaiser Wilhelm der Grosse.....	8	158.8	151.3
Lahn	11	192.1	183.3
Havel	7	192.1	185.2
Trave	12	192.9	184.0
Saale	6	195.1	189.9
Spree	1	198.3	198.3
Kaiser Friedrich	1	231.7	231.7
CUNARD (NEW YORK TO LONDON, VIA QUEENSTOWN):			
Lucania	12	161.8	157.3
Campania	12	163.5	157.3
Etruria	12	181.7	172.4
Umbria	12	183.3	176.7
Servia	6	213.1	210.9
Aurania	6	216.3	201.5
AMERICAN (NEW YORK TO LONDON, VIA SOUTHAMPTON):			
St. Louis	12	171.6	166.3
St. Paul	12	174.5	168.3
New York	5	189.6	182.0
Paris	11	191.6	177.1
Berlin	1	239.2	239.2
HAMBURG-AMERICAN (NEW YORK TO LONDON, VIA SOUTHAMPTON):			
Columbia	5	174.3	173.7
Fürst Bismarck	9	177.8	171.7
Normannia	6	180.4	171.4
Augusta Victoria	5	187.8	174.8
WHITE STAR (NEW YORK TO LONDON, VIA QUEENSTOWN):			
Teutonic	13	176.3	168.8
Majestic	12	176.5	171.4
Germanic	13	203.1	197.1
Britannic	12	216.3	204.0
Adriatic	2	238.9	235.9
GENERAL TRANSATLANTIC (NEW YORK TO PARIS, VIA HAVRE):			
La Touraine	8	202.2	187.3
La Bretagne	11	205.8	197.6
La Bourgogne	3	208.4	201.2
La Champagne	8	210.7	197.5
La Gascogne	11	211.1	198.3
La Navarre	4	216.1	210.3
La Normandie	7	225.8	204.4

CHICAGO GRAIN FLEET—LAKE CARRIERS' ANNUAL.

The movement begun in Cleveland, a few days ago, to have inserted in all grain charters made in Chicago during the winter, a clause providing that the ships are not to move until April 25, is not an affair of the Lake Carriers' Association, although it was endorsed by all members of the executive committee of the association who attended the Cleveland meeting. The association has refrained at all times from taking action in matters pertaining in any way to freights, but questions of this kind are taken up by the members meeting as vessel owners after adjournment of the association meetings, as was done in this case. There will probably be some objection to the proposed action at Chicago, but it is more than probable that the majority of vessel owners are favorable to such a movement and that the underwriters will do all they can in the matter. Of the total increase of 1,435,143 gross tons in ore shipments this year, full 1,200,000 tons was gained in the first month of the season. There was practically no gain after the middle of May. It is a fact also that when the grain fleet reached Lake Erie ports last spring, they found the opening so early that there was practically no return business, and some of them were tied up in port for a period of nearly two weeks. These are the conditions that prompt the movement to delay departure of the fleet from Chicago next spring.

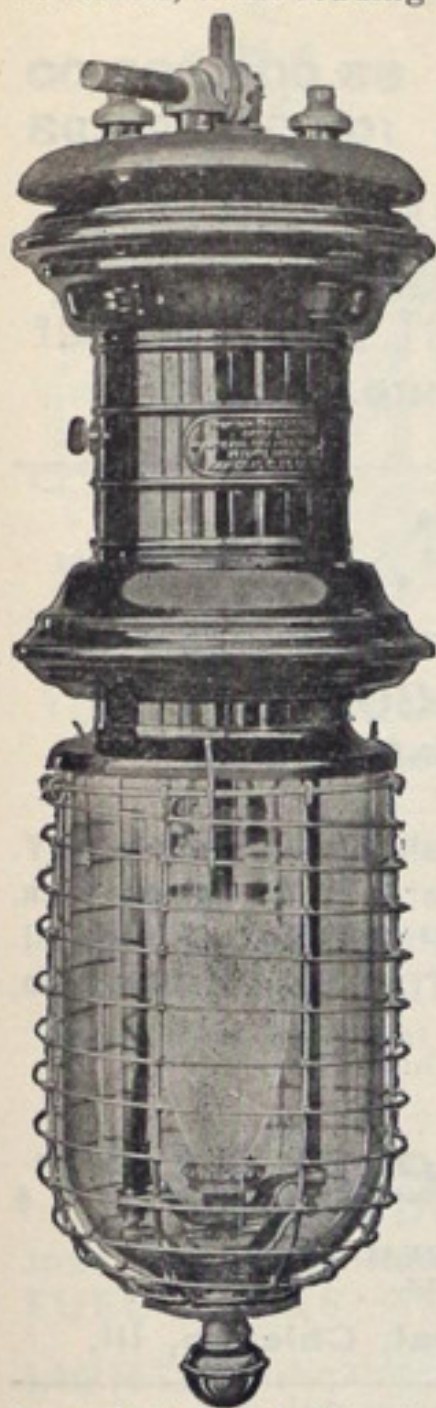
It was decided by the executive committee of the association to leave the matter of fixing a date for the annual meeting of the general organization in Detroit to Secretary Keep and Treasurer McKay, but as the committee practically decided on March 22, it is more than probable that the annual meeting will be delayed this year until that date. It is thought a better attendance will be secured at a late meeting, and more time will be given to consider during the winter the subjects that are to be discussed. The meeting will very probably be held at the Russell House.

Changes in the new monitors will not be as radical as at first contemplated. After a week's discussion between the naval board on construction and the four firms to whom the contracts for the new single-turret monitors were given a conclusion has been reached which seems to be dictated chiefly by an unwillingness to refer the matter to congress for further appropriation. The proposed second turret is given up. One turret with 12-inch rifles as planned originally will be provided, but the hulls will be lengthened 27 feet, raising the displacement from 2,800 to 3,100 tons. This will give room for 200 tons more coal, increasing the bunker capacity to 400 tons. The speed will be reduced to 11½ knots, which will not please the service. This modified plan has not been submitted to the secretary as yet. Such changes indicate an abandonment of the coast defense idea as the exclusive field of these monitors.

With their peerless trio of fast express trains daily, low rates, unexcelled dining car service and magnificent vestibuled sleeping cars through to New York City and Boston, the Nickel Plate road offers the traveller to those points every comfort and convenience demanded by the exacting American public.

MARINE ARC LAMP.

Adequate electric illumination of wharves, docks, warehouses, dry docks, ship yards, with their adjacent iron working shops, and the holds of vessels, while loading or discharging, demands a type of lamp somewhat different from that used for street or store lighting. It must be strong, compact and durable, or it will not withstand the hard usage which such service will naturally give it; it should give a large volume of clear, white light, which will not dazzle the eyes of the workmen nor throw heavy shadows in already obscure corners; it should require little attention, and be so simple that it can be attended by an average lamp trimmer; lastly, it should require trimming not daily, but only at long intervals.



The lamp which, perhaps, best meets these requirements is the marine enclosed arc lamp, manufactured by the General Electric Co. It has been made the object of special design to adapt it to marine usage on shipboard or land. The mechanism is compact, simple and reliable, and is protected from injury or the effects of the weather by a stout metal casing. It is only necessary to renew the upper or long carbon once in 100 to 150 hours, the lower carbon after the first run, being the unburnt remainder of the upper carbon. With open arc lamps it was necessary to renew the carbons daily. The outer globe, shown as of clear glass in the illustration, is cylindrical in shape, of thick glass and protected from injury by a heavy wire guard. The globe can be lowered by a half turn of the thumb screw at the side, and when pushed back in position is automatically and securely locked. The lamp is only 28 inches long. It can be carried from place to place if necessary, and hung by the metal ring at the top on any convenient hook, or may be permanently fixed in place like an ordinary arc lamp. The lamp can be used on a 110 volt circuit and can be adjusted for 4, 4.5 or 5 amperes, the latter being the standard. Many of these marine lamps have

been installed in locations such as those mentioned above, and have in every case given very satisfactory service.

A wonderful record in the lake ore trade was made during the season just passed by the steel steamer Coralia, owned in the office of M. A. Hanna & Co. This steamer, commanded by Capt. Wm. Cumming, made thirty-six trips and delivered 187,129 gross tons of iron ore at Ohio ports. This is an average of 5,198 gross tons per trip. The Coralia made thirty-four trips to Escanaba, and two trips to the head of Lake Superior, going up light all the time. The distance from Ashtabula to Escanaba and return is 1,180 miles, and from Ashtabula to the head of the lakes and return about 1,750 miles, so that the number of miles run by the Coralia during the season in carrying this ore is about 43,700.

One of the passengers on a west-bound sailing packet, trading between Liverpool and New York before the days of steam, was a kind-hearted old lady, new to the ways of the sea. One day she witnessed the mate taking a sailor to task for slowness in executing an order, and vigorously rebuking the man with an iron belaying pin. She retired to her stateroom in indignation, and refused to come out for the remainder of the day. Venturing out the following morning, she espied the same sailor taking his trick at the wheel. With a voice full of pity she inquired of him: "My poor man, how is your head?" "West-northwest, mum," replied the old salt with a salute.

Castner, Curran & Bullitt of Philadelphia issue a calendar advertising Pocahontas coal that is probably the biggest thing of its kind ever turned out of a printing office. This calendar is not a beauty, but once a business man is fortunate enough to secure one, it is never supplanted by any other, no matter what the attractions of the later arrival may be. The bigness of the Pocahontas calendar is its best feature. It is of the perpetual kind. Attachments for 1899 are now being issued.

Randolph & Clowes, Waterbury, Conn., are rapidly repairing the damage sustained by their plant in the recent storm. Operations in the brass mill were interrupted for only a few days. Last Monday morning saw the entire brass and copper mill in full operation. No damage occurred in any other part of the works, and the seamless tube, brazed tube, kettle and boiler plants have been in operation without interruption. The damage to the machinery was small, aggregating less than \$1,000.

The December number of the Review of Reviews is a notable one and contains among other articles one by Lieut. J. H. Parker, U. S. A., on the defects of the supply departments of the army and navy as demonstrated by events during the recent war. There are also reviews of current topics by the editor and numerous illustrations.

The United States government has decided to sell the monitor Wyandotte, built during the civil war. She is 225 feet long, 43 feet beam, 13 feet depth, of 2,100 tons displacement, 340 horse power, cost \$33,327, and is now appraised at \$7,000.

When you are planning to spend your winter in a milder climate, do not overlook the advantages offered by California. Low rates are in effect via the Nickel Plate road, and each of their peerless trio of fast express trains makes direct connections at Chicago with all lines to California. Inquire of agents of the Nickel Plate road for additional information.

274, Dec. 20.

TRADE NOTES.

The Berlin Iron Bridge Co., East Berlin, Conn., has just completed a bridge having two spans of 70 feet each for the town of Newport, Herkimer county, N. Y.

The Q. & C. Co., Chicago, has increased largely the capacity of its shops, and is developing several new machines in the line of metal work. This increase of capacity is in view of the favorable business outlook.

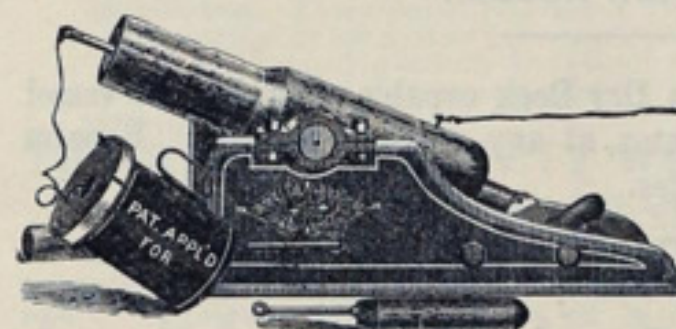
The Babcock & Wilcox Boiler Co., Courtlandt street, New York city, has received an order for boilers for the Wilson liner Tasso. This will be the eighth vessel of this line fitted with Babcock & Wilcox boilers.

The Ajax Mfg. Co., builders of the Blakeslee machines for forging and bolt heading, have lately, together with the Patterson Foundry Co., moved into the large re-modeled buildings, formerly occupied by the Paige Car Wheel Co. on Lake street, near Wasson, Cleveland.

Mr. J. W. Duntley, president of the Chicago Pneumatic Tool Co., sailed from New York to look after his company's interests in Great Britain and on the continent of Europe. The company's trade is constantly increasing, and the call for its tools from all over the country is larger than ever before, taxing to the utmost its increased facilities. Activity in all the ship and navy yards in this country has created a very large demand for this company's pneumatic tools, and the demand among the railways is larger than ever before.

Special inducements are offered by the Nickel Plate road to students desiring to return home for the holidays. Inquire of agents relative to rates and limits.

274, Dec. 20



LYLE PATENT LIFE-SAVING LINE-CARRYING GUN

For Steamships and Vessels.

Also for throwing a life-line to a wreck from the shore

Furnished by us to the different ships of the Cunard, Pacific Mail, Warren, Leyland and other principal lines; also to Chapman Wrecking Co. of New York, and others. No steamship or large Yacht should be without one of these guns. Send for descriptive circular.

Price of large Gun, complete with line and outfit.....\$115.00

Smaller size, to be used from the shoulder, especially suitable for

Tow Boats, complete..... 25.00

WM. READ & SONS, 107 Washington Street, BOSTON, MASS.

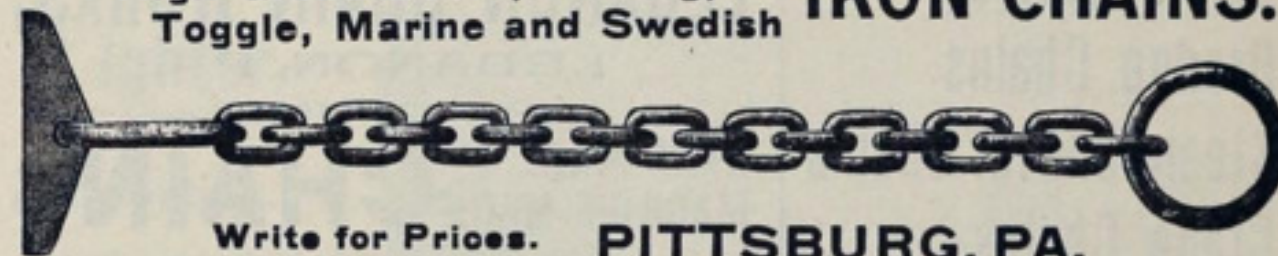
WANTED—Triple Expansion Engine

of 4½ by 7 inches high pressure cylinder, or 5 by 7 or 8 high pressure. Must be cheap for cash. Address J. K. Cobb, 15 Grand River avenue, Detroit, Mich.

JAMES MCKAY & CO.

Manufacturers of all kinds of

High Grade Boom, Rafting, **IRON CHAINS.**
Toggle, Marine and Swedish



Write for Prices. **PITTSBURG, PA.**

LUCE'S SEAMANSHIP.

NEW REVISED
EDITION...

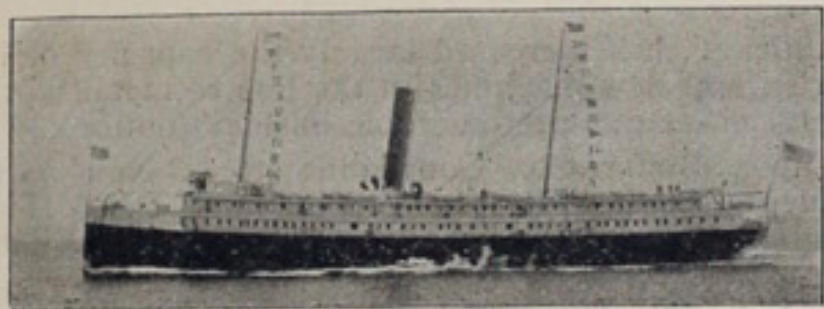
One of the most notable technical publications of the year, just issued.

For Sale by the MARINE REVIEW.

U. S. ENGINEER OFFICE, Duluth, Minn., Dec. 10, 1898. Sealed proposals for furnishing 12,000 barrels of Portland cement for the concrete superstructure for piers for Duluth ship canal will be received here until noon, Jan. 10, 1899, and then publicly opened. Information furnished on application. Clinton B. Sears, Major, Engrs. J a n. 5

SEALED PROPOSALS will be received at the office of the Light House Engineer, Buffalo, N. Y., until 12 o'clock M., Friday, January 20, 1899, and then opened, for complete construction and erection of a duplicate steam fog signal house and apparatus at Presqu'île, Erie Harbor, Pa. All information may be had upon application to Thomas W. Symons, Major, Corps of Engineers, U. S. A. Dec. 22,

ROACH'S SHIP YARD.



DELAWARE RIVER
IRON
SHIP-BUILDING &
ENGINE WORKS,
CHESTER, PA.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

New York Office, Morgan Iron Works, Foot East Ninth St

Newport News Shipbuilding & Dry Dock COMPANY.

WORKS AT NEWPORT NEWS, VA.
(On Hampton Roads.)

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long, drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

SHIP AND ENGINE BUILDERS.

For estimates and further particulars, address

C. B. ORCUTT, Pres't,
No. 1 Broadway, New York.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

Builders of IRON AND STEEL STEAMERS, STEAM YACHTS,
TOW BOATS, MARINE ENGINES, BOILERS, TANKS,
AND OF HEAVY MACHINERY GENERALLY.

ALSO COPPERSMITH WORK.

SPECIAL FACILITIES for REPAIRS to both WOODEN and METAL BOATS.
MARINE RAILWAY. NO WHARFAGE CHARGED.

Ship's Cables
Dredge Chains
Steam Shovel Chains
Crane Chains
Block Chains

LEBANON CHAIN WORKS,
LEBANON, PA.

MANUFACTURERS OF
HAND-MADE AND
MACHINE-MADE **CHAINS**
OF ALL GRADES.

WE MANUFACTURE OUR OWN IRON.
All our Chains are tested. High Grade Chains a Specialty.



THE CRUMLISH FORGE For Rivet Heating.
USED BY THE LEADING
Ship Builders, Bridge Building and Structural Concerns.
CRUMLISH FORGE CO.
Send for Circular. BUFFALO, N. Y.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.
ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - \$3,000,000.00
ASSETS, - - - - - 10,023,220.93

CHARLES PLATT, President.

UGENE L. ELLISON, Vice-President.

JOHN H. ATWOOD, Assistant Secretary.

GREVILLE E. FRYER, Sec'y. & Treas.

T. HOWARD WRIGHT, Marine Sec'y.

Lake Marine Department.

GEORGE L. McCURDY, Manager
CHICAGO, ILLS

Chas. E. & W. F. Peck,

58 William St., NEW YORK CITY.

Royal Insurance Building, CHICAGO, ILL.

C. T. BOWRING & CO.,

5 and 6 Billiter Avenue, E. C., LONDON, ENG.

INSURANCE

BROWN & CO., . . . 202 Main Street, Buffalo, N. Y.
PARKER & MILLEN, 15 Atwater St., W., Detroit, Mich.
J. G. KEITH & CO., 138 Rialto Building, Chicago, Ill.
LA SALLE & CO., Board of Trade Bldg., Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the Great Lakes, both CARGOES and HULLS.

Great Lakes Register,

Combined and issued in connection with BUREAU VERITAS
International Register of Shipping.

F. D. HERRIMAN, Surveyor-General, Chicago, Ill.

THE MANHATTAN RUBBER M'FG CO.

FACTORIES—Passaic, N. J.

HEADQUARTERS—18 Vesey St., N. Y.

BRANCH SALESROOMS

No. 212 Champlain St., CLEVELAND, O.

W. D. ALLEN, 151 Lake St., CHICAGO, ILL.

MANUFACTURERS OF

High Grade of Marine Valves, Sheet and Piston Packings.
Deck, Steam and Fire Hose of every description CARRIED IN STOCK.

BUILDERS OF LAUNCHES

AND OTHERS needing Cast Brass, Bronzes and similar metals. Want to hear from you. Want to furnish you with

Boat Trimmings, Propeller Blades, Wheels, Engine Bearings, and other things.

Can furnish the rough castings or completed parts, polished or nickel plated. Clean solid castings, A No. 1 quality. Phosphor bronze bearings a specialty. Send sample, patterns or drawings.

STANDARD BRASS WORKS, Kalamazoo, Mich.

C
O
A
L

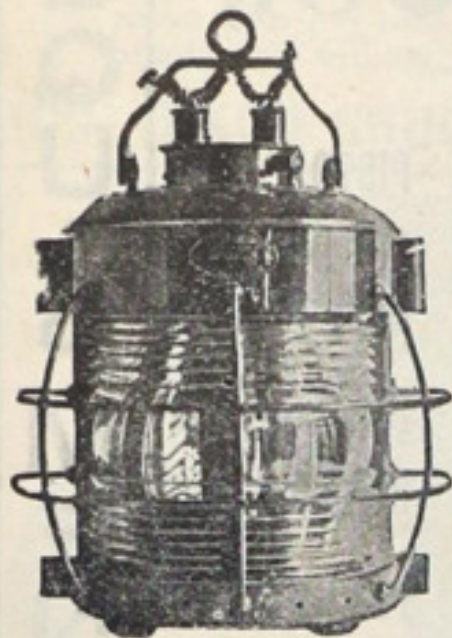


C
O
A
L

PATENTS

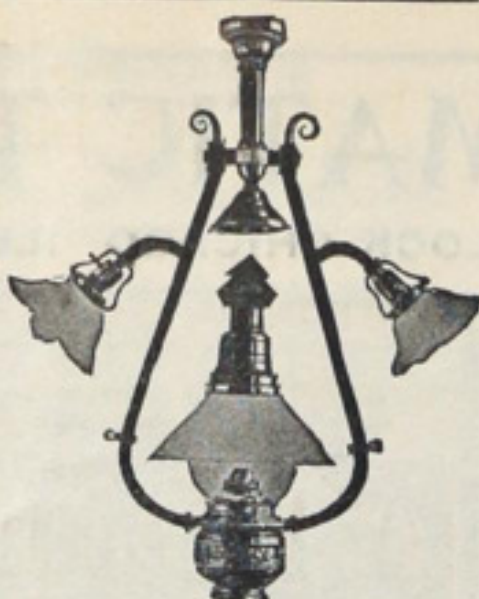
A special opportunity to reduce cost of fees involved in securing a patent of any kind.
A. DISCOURT,
409 Perry-Payne Building, Cleveland, O.

MARINE LAMPS



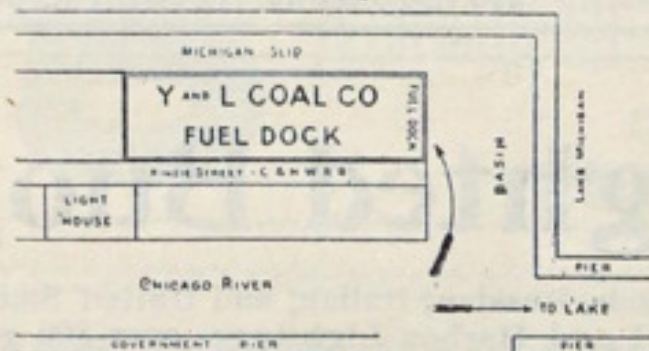
Oil and Electric
Equipment for
Steamships,
Yachts, etc.

Signal Lights,
Saloon Fixtures,
Cabin Lamps,
Lanterns, etc.



Wm. Porter's Sons,
271 Pearl St., NEW YORK CITY.

FUEL FOR STEAMERS AT CLEVELAND AND CHICAGO
Youghiogheny, Pittsburg and New River Coal.



VIEW OF DOCK NO. 1, CHICAGO HARBOR.

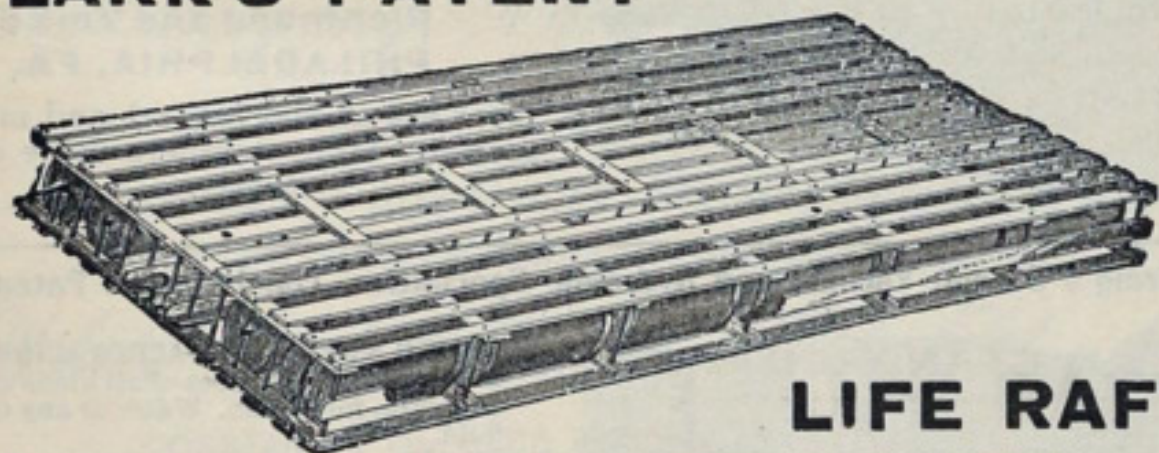
YOUGHIOGHENY & LEHIGH COAL CO.

JOHN T. CONNERY, Mgr. ARCHIE J. HITCHCOCK, Dock Supt.
FUEL DOCKS—No. 1, Michigan Slip and Basin; Phone —
No. 2, North Halstead St. Bridge. Phone 773 North.
LIGHTER—Equipped with 125 two ton buckets for fuel-
ing anywhere in harbor of **CHICAGO.**
Main Office, 1238-1242 Chicago Stock Exchange Building,
110 La Salle Street, Chicago, Ill. Long Distance Telephone, Main 5049.

THE PITTSBURGH & CHICAGO GAS COAL CO.

J. A. DONALDSON, Mgr. N. J. BOYLAN, Dock Mgr.
Latest Dock and Lighter equipment for rapid fueling.
FUEL DOCKS—River Bed, through Valley Railway
Bridge and Foot of West River St., **CLEVELAND.**
LIGHTER—With 150 2½ ton buckets (400 tons capacity.)
TELEPHONES: { Main Office—Main 1888.
Fuel Dock Office—West 190.
420-421 PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

CLARK'S PATENT



LIFE RAFT.

COPPER AND HEAVY SHEET IRON WORK,
McCOY LUBRICATORS, BRASS MARINE WORK.
STEAM FITTING, ENGINEERS' SUPPLIES.

DETROIT

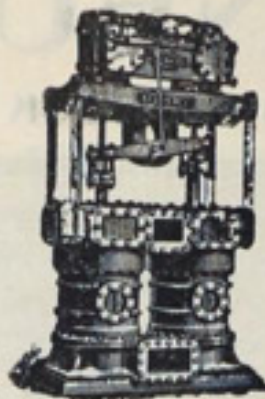
SHEET METAL AND BRASS WORKS.
FOOT OF ORLEANS STREET. OPEN DAY AND NIGHT.

THE GEO. F. BLAKE MFG. CO.

BUILDERS OF

MARINE PUMPS

Single and Duplex Pumps for Boiler Feed,
Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps
for Surface and Jet Condensers.



AIR PUMP ON
U. S. CRUISER NEW YORK.

95 and 97 Liberty St., NEW YORK.

The Roberts Boiler Co.

Have built about 1000 BOILERS TO DATE for

Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-
Wheelers, Canalers; also for Navy Department, War Department, Treasury
Department, Light-House Board and Revenue Cutter Service; also for N.
Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

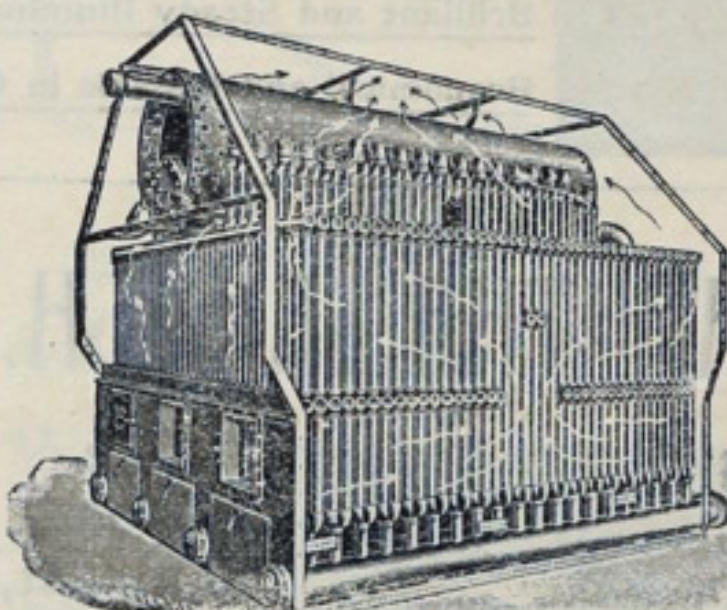
Never killed a man or had a serious accident. \$250,000 capital. Works
covering 29,000 square feet of ground. Never had a boiler returned on account of dis-
satisfaction. Every Boiler Warranted. All material made specially for our use. All
boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before ship-
ping. Workmanship strictly first-class. All joints screwed and reliable. No expanded
joints. State your requirements and we will furnish specifications. Correspondence
solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

39 and 41 Cortlandt Street, New York City.

Works. Red Bank, N. J.

THE "TAYLOR" YACHT BOILER



Has held the record three
seasons on the fastest yacht
on the great lakes.

Guaranteed against
Rupture of Tubes.
Will not Prime in the
Roughest Sea.

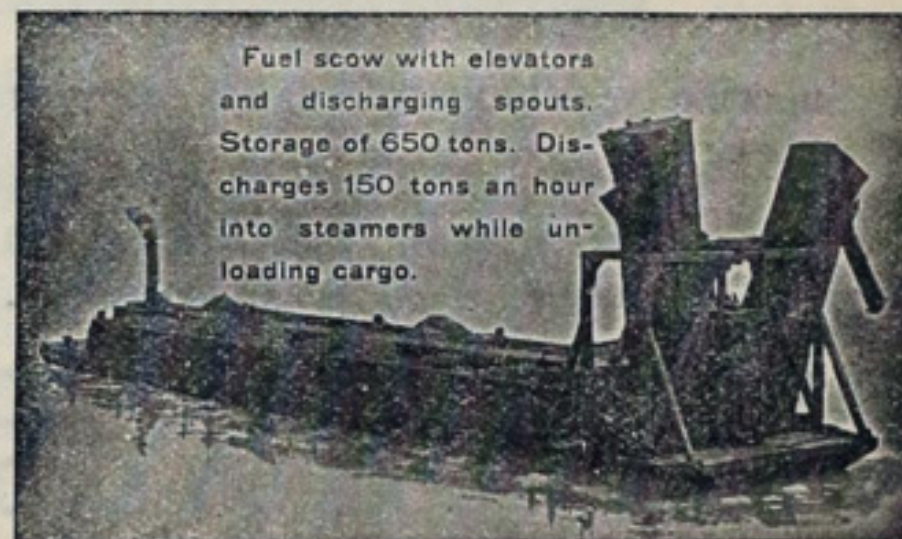
MANUFACTURED BY

Detroit Screw Works,
FOOT OF REOPELLE ST.,
DETROIT, MICH., U. S. A.

Steamboat Fuel at Ashtabula. LARGE SUPPLIES OF
BEST QUALITY.

Lighter

Carrying
Different
Grades
at all
Times.



Fuel scow with elevators
and discharging spouts.
Storage of 650 tons. Dis-
charges 150 tons an hour
into steamers while un-
loading cargo.

M. A. HANNA & CO., Miners and Shippers.
Main Office, Perry-Payne Bldg., Cleveland

Chain Department * P. HAYDEN S. H. CO. * Columbus, Ohio.

Our Chain in use on the Largest Steamers on
the Lakes:

The Zenith City, Victory,
North West and North Land,
and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.

H. A. BARR, PRESIDENT, F. H. VAN CLEVE, SMC. CAPT. GEO. BARTLEY, SUPT.
Escanaba. Escanaba. Escanaba.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawseers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, { Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch.
Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, { Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, { Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

THOS. DREIN & SON, TATNALL AND RAILROAD STS., WILMINGTON, DEL.

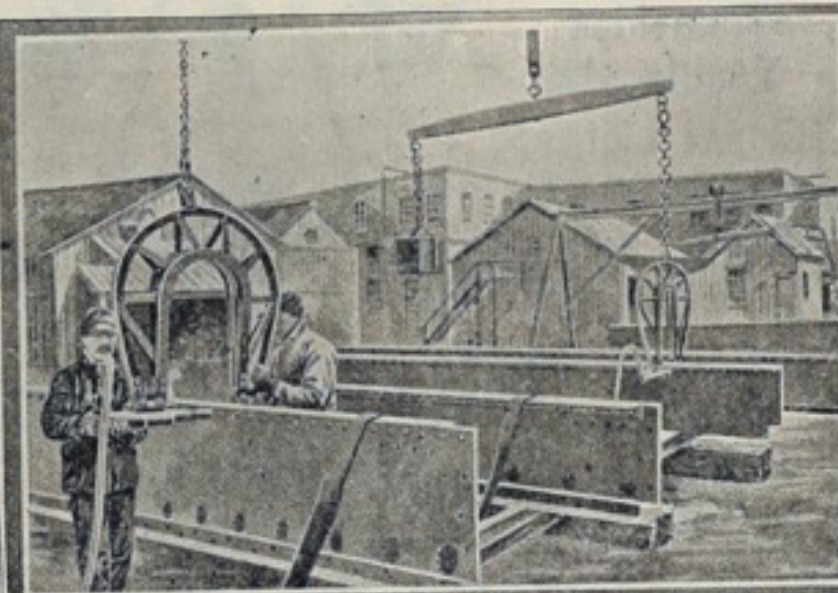
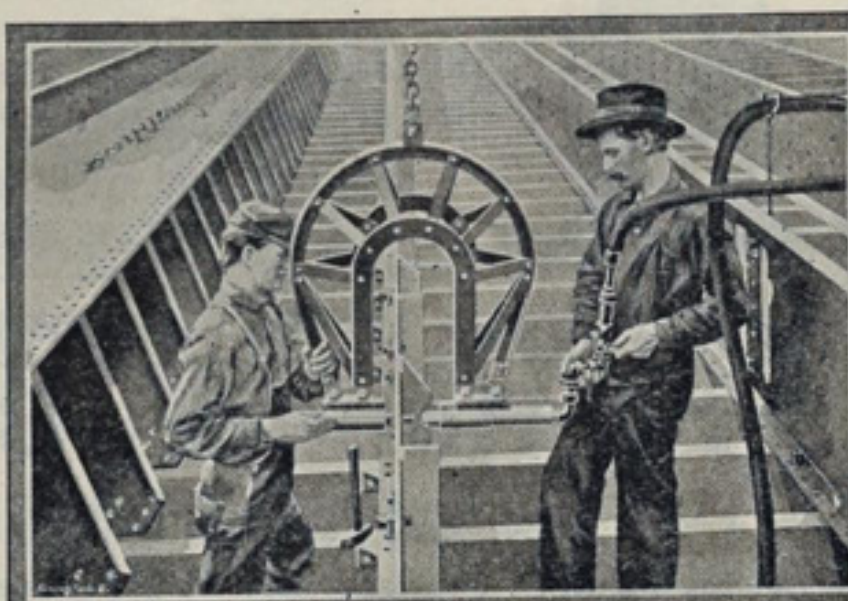


Builders of Metallic
Life Boats and Rafts,
Yachts and Pleasure
Boats, Life Pre-
servers. Outfit for
Lake Steamers a
Specialty.

SHIP
YARD

CHICAGO PNEUMATIC TOOL CO.,

635 MONADNOCK BLOCK CHICAGO ILL.

PNEUMATIC
HAMMERS
FOR
CAULKING
AND
CHIPPING.PISTON
AIR DRILLS
FOR
DRILLING and
REAMING.
PNEUMATIC
RIVETERS.

EQUIPMENT

MACHINES GUARANTEED ONE YEAR AGAINST REPAIRS, and TOOLS SENT ON TEN DAYS' TRIAL Subject to Approval. New York Office No. 112 Liberty St., Beard Bldg.



Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 800 gas buoys and gas beacons in service.

Burn Continuously

from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

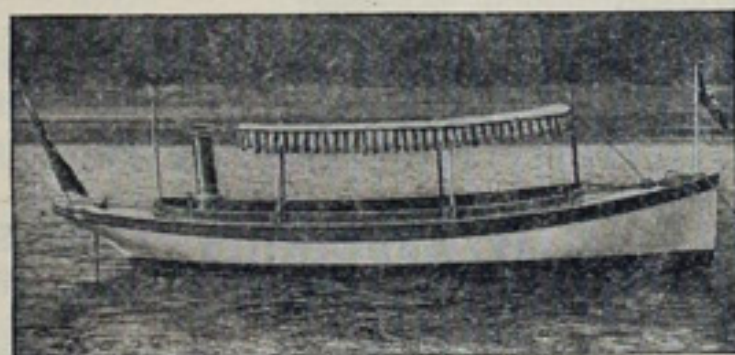
Brilliant and Steady Illumination.

Economical and Reliable in Operation.

Controlled
by theSAFETY CAR HEATING
AND LIGHTING CO.,

160 Broadway, New York City.

THE ONLY NAPHTHA LAUNCH.

NEARLY
3,000
IN USE.The
Safest,
Simplest,
Speediest
power
boat.

Superiority demonstrated by ten years' experience.

STEAM AND SAIL YACHTS.
MARINE ENGINES AND "SEABURY"
WATER TUBE BOILERS.GAS ENGINE & POWER CO., AND
CHARLES L. SEABURY & CO., Consolidated.

Morris Heights, New York City.

SEN IOC. STAMP FOR CATALOGUE.

Fred'k Baldt, President.

W. M. Gelston, Vice President

W. S. Bickley, Sec'y and Treas.

Baldt Patent Stockless Anchor.

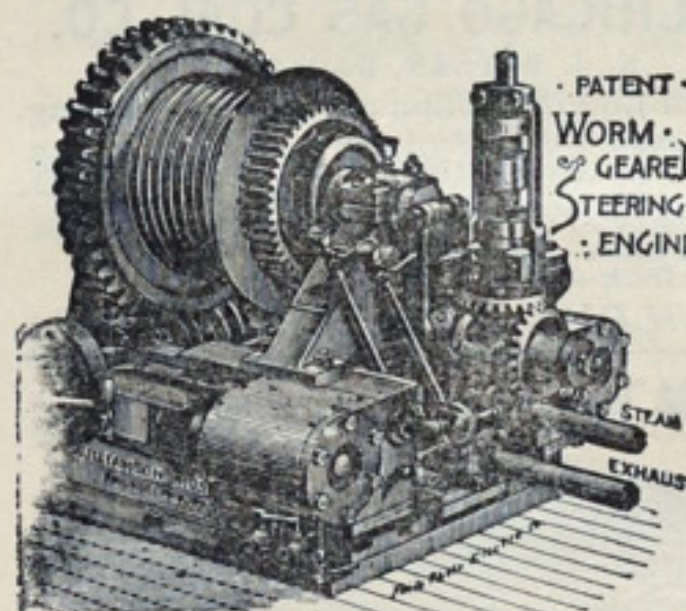
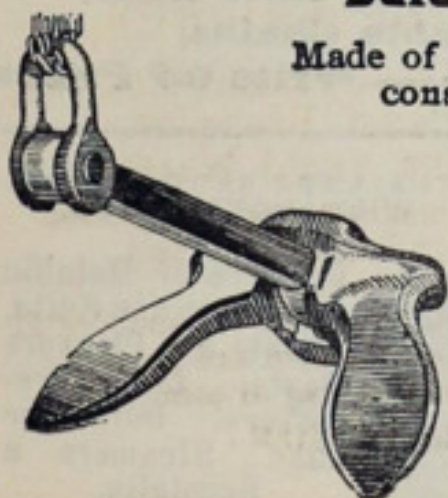
Made of the finest quality of open-hearth steel and constructed on the ball and socket principle.

Many points of superiority over ordinary Stockless Anchors.

BALDT ANCHOR COMPANY,
CHESTER, PA.WALTER MILLER, Western Reserve Bldg
Cleveland, Ohio,

Representative for the Great Lakes.

New catalogue containing valuable tables sent on application.

Hoisting and Steering
ENGINES.

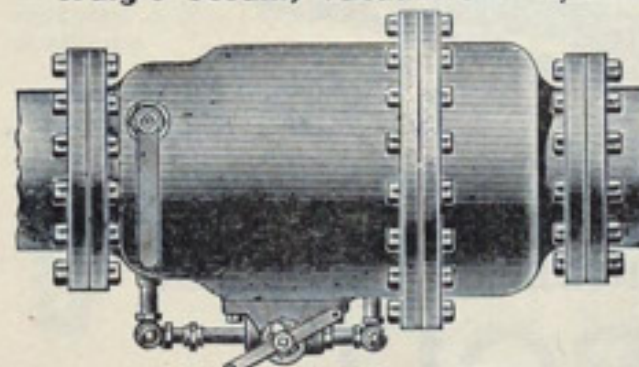
With either Frictional, Spur or Worm Gear of various patterns to suit all purposes.

Williamson Bros.

Richmond and York Sts.
PHILADELPHIA, PA.

Over 150 of the largest and most modern lake steamers have our steerers.

Craig's Steam, Vacuum and Hydraulic Specialties, consisting of Patent



Automatic Stop Valve.

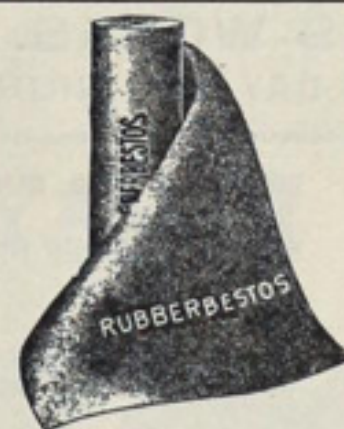
Address WILLIAM CRAIG, 42 Cortlandt St., New York.

IMPROVED SAFETY QUICK-ACTION AUTOMATIC STOP VALVES, for Pipes of all kinds under Pressure, for Steam, Water or any other fluid.

IMPROVED AUTOMATIC EXHAUST RELIEF VALVES, for Condensing and Non condensing Engines, Marine or Stationary.

IMPROVED AUTOMATIC JET CONDENSING APPARATUS, for all kinds of Steam Engines.

IMPROVED HEATING AND CIRCULATING APPARATUS for Marine Boilers.



THE LATEST!

THE BEST!

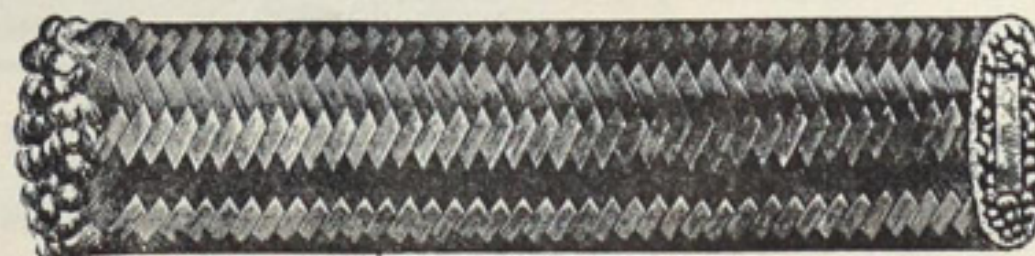
"RUBBERBESTOS"

A Perfect Combination of Asbestos and Rubber.

A Combination Approved by all Practical Engineers, and is a NEW DISCOVERY in the MANUFACTURING of SHEET PACKING.

THE HIGH
PRESSURE PACKING

"METALBESTOS"



The Most Successful Marine Steam Packing Made!

Made of ASBESTOS and covered with a SOFT METALLIC WIRE.
It Cannot Burn, Char or Blow Out. Try It! It Will Save You Lots of Trouble!

SEND FOR SAMPLES.

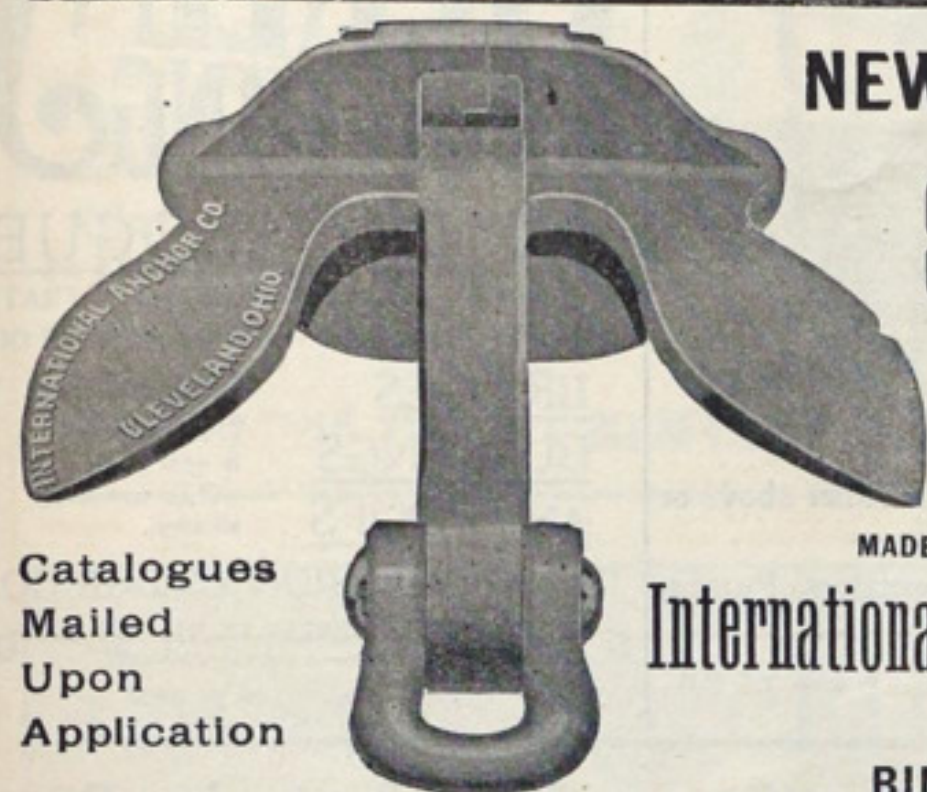
A. W. CHESTERTON & CO., 49 India St., BOSTON, MASS.

If you use Square Flax send to us for a sample of our new brand, The "Overseas Special." It will interest you.

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



**NEW PATENT
STOCKLESS
ANCHOR**

MADE BY THE
International Anchor Co.
CLEVELAND, O.
BINGHAMTON, N. Y.

Catalogues
Mailed
Upon
Application

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & S." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR
CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, Ohio.

AN EXCELLENT LIBRARY FOR A MARINE ENGINEER, CHEAP
—KEY TO ENGINEERING; WHAT AN ENGINEER SHOULD
KNOW ABOUT ELECTRICITY; ENGINEERS' CATECHISM. ANY
ONE OF THESE ARE WORTH A DOLLAR, BUT ALL THREE CAN BE
HAD FOR \$1. SEND TO THE MARINE REVIEW, 409 PERRY-PAYNE
BUILDING, CLEVELAND, O. MONEY REFUNDED IF NOT SATIS-
FACTORY.

OUR NEW CATALOGUE

OF

Yacht, Boat and Canoe
Hardware and Supplies,

NOW READY.

Have you sent for one?
They will be forwarded in
the order in which the re-
quests are received.

Send 10 cents in stamps.

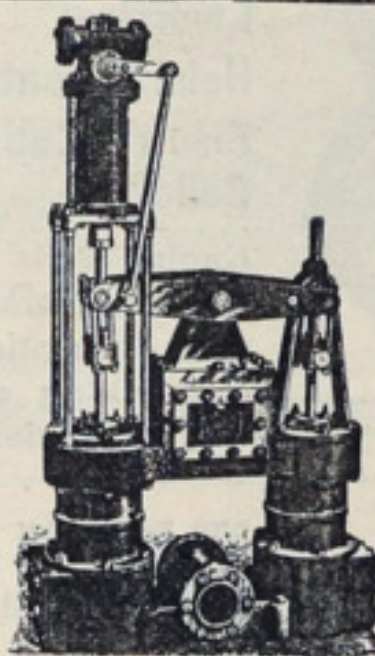
L. W. Ferdinand & Co.,

184 Federal St., BOSTON, MASS.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE
PAMPHLET which is FREE to all interested. It will pay all
Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



M.T. DAVIDSON,

VERTICAL OR HORIZONTAL

MARINE || AIR || PUMPS
CIRCULATING
BOILER FEED
BILGE

Single or Duplex. Combined or Independent.

Surface Condensers. Ash Ejectors.

43-53 Keap Street, BROOKLYN.

Branches: { 133 Liberty Street, NEW YORK.
30 Oliver Street, BOSTON.

HOWARD H. BAKER & CO.

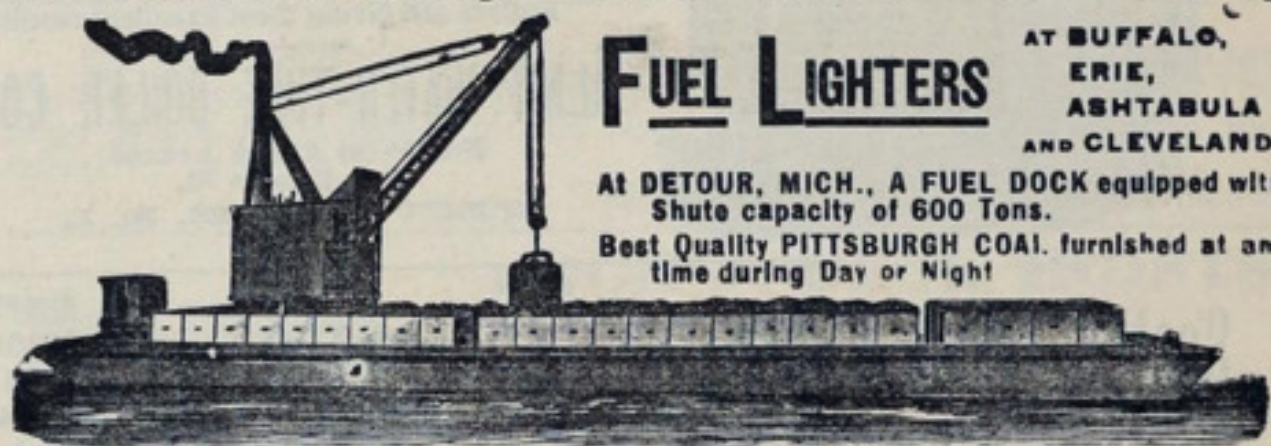
Ship Chandlers and Sail Makers,

18 to 26 Terrace, BUFFALO, N. Y.

U.S. METALLIC PACKING CO.,
427 North 13th St.,
PHILADELPHIA, PA.

Rod Packing for all kinds of steam
service. Prices from \$5.00 per inch up.
Write for catalogue.

Pickands, Mather & Co.,



FUEL LIGHTERS

AT BUFFALO,
ERIE,
ASHTABULA
AND CLEVELAND.

At DETOUR, MICH., A FUEL DOCK equipped with
Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any
time during Day or Night

Western Reserve Building, CLEVELAND, O.

**H. G. TROUT,
KING IRON WORKS,**

BUFFALO, N. Y..

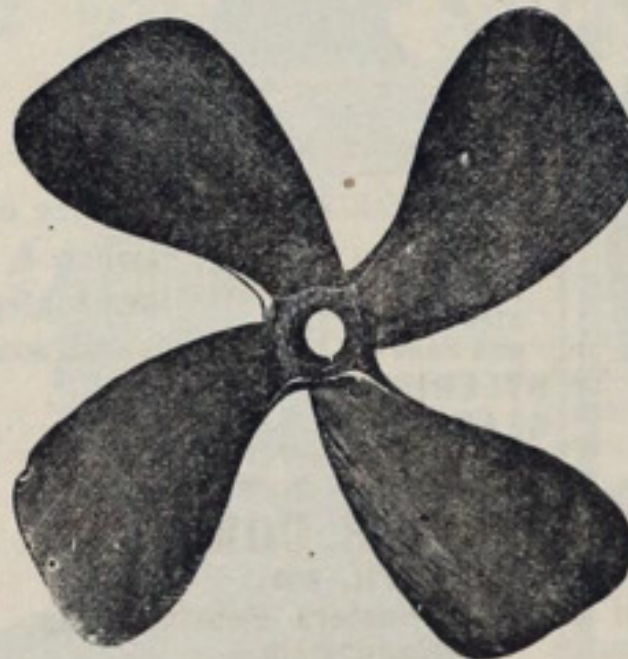
MANUFACTURERS OF

**TRIPLE EXPANSION,
THREE CYLINDER,
FORE AND AFT
And STEEPLE COMPOUND
MARINE ENGINES,**

High and Low Pressure Engines,
Sectional Propeller,
Tug and Yacht Wheels,
Cowles Aluminum and Manganese
Bronze Propeller Wheels.

These Wheels are noted for their extra
speed, towing power and propor-
tionate saving of coal.

PRICES QUOTED ON APPLICATION.



A. J. MORSE & SON.
DIVING APPARATUS
 140
CONGRESS ST. BOSTON.

Chicago Nautical School,
20 MICHIGAN AVE., CHICAGO.

A Full and Complete Course of Instruction in Lake and Ocean Navigation. Candidates prepared for Examinations before Local Inspectors.

GREAT LAKES REGISTER PRIZES.
 Two Prizes, \$50; Six \$25.

Students may begin at any time.

SEND FOR CIRCULAR.

Chas. Corv & Son

Manufacturers of the
**Mechanical and Electric
 Marine Telegraph,**

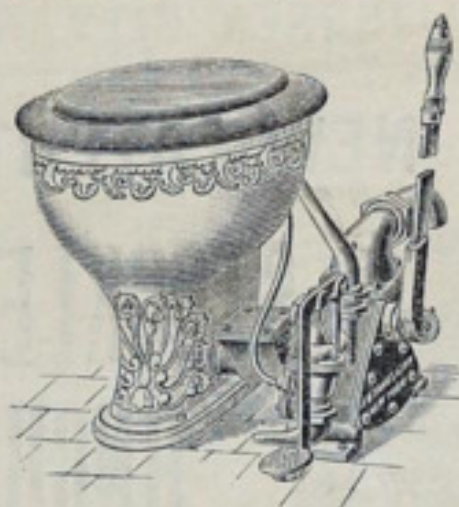


**Electrical
 Helm Indicator
 Electric Call
 Bells.**

Engine Bells and
 Brass Work of
 all descriptions,
 Shrieking and
 Siren Whistles.

**278 DIVISION ST.,
 NEW YORK CITY.**

ALFRED B. SANDS & SON,
**MARINE PLUMBERS
 AND MANUFACTURERS OF
 Marine Plumbing Specialties.**



Marine Water Closet for either above or
 below water line.
 Folding Lavatories, Ventilators, Pumps,
 Tanks, &c., &c.

134 BEEKMAN ST., NEW YORK.

BRIDGES BERLIN BUILDINGS

OUR CATALOGUE

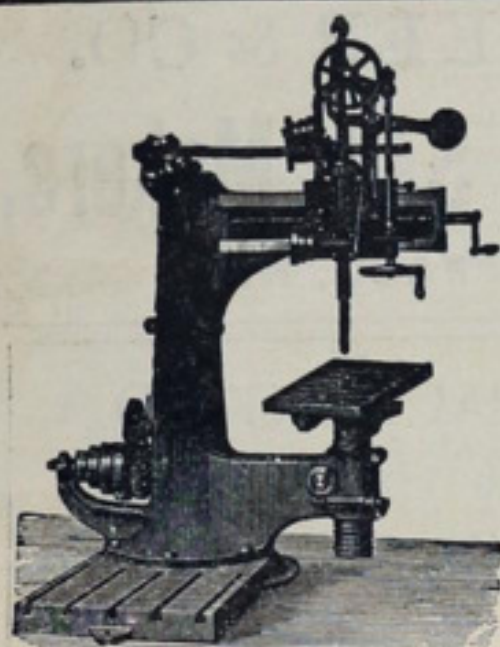
OF THREE HUNDRED PAGES ILLUSTRATING AND DESCRIBING A LARGE NUMBER OF

**BRIDGES
 BUILDINGS
 AND ROOFS**

Designed and
 Built by us
 Is now ready and
 will be sent on ap-
 plication.

THE BERLIN IRON BRIDGE CO.

EAST BERLIN, CONN.



Bement, Miles & Company,
PHILADELPHIA, PA.

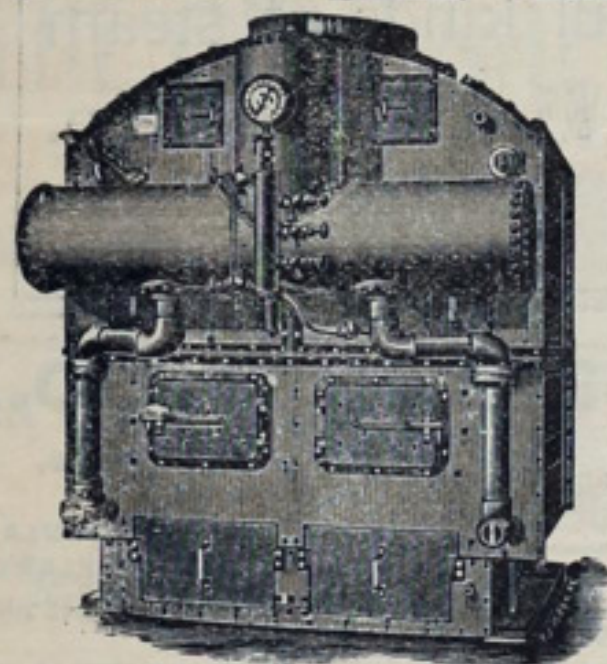
MANUFACTURERS OF

Metal Working Machine Tools

For Ship Yards, Railroad Shops,
 Locomotive and Car Builders,
 Machine Shops, Rolling Mills,
 Steam Forges, Boiler Shops,
 Bridge Works, etc., etc.

**Steam Hammers, Steam and
 Hydraulic Riveting Machines.**

New York Office: Taylor Bldg. No. 39 Cortlandt St.
 Chicago Office: 1534 Marquette Building.



**ALMY'S PATENT
 SECTIONAL
 Water-Tube Boilers.**

NOW USED IN

12 Passenger Boats from 70 to 160 feet long.
 27 Steam Yachts from 50 to 160 feet long.
 U. S. Torpedo Boat "Stiletto."
 Numerous Small Launches and Stationary
 Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

No. 178-184 Allens Avenue,
 near Rhodes St.

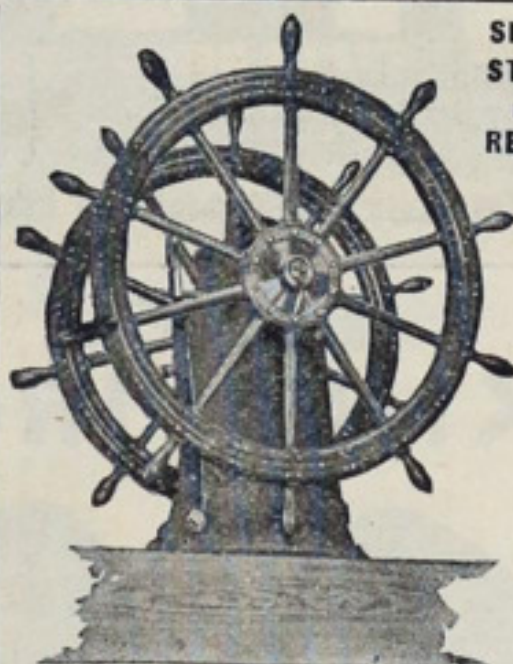
PROVIDENCE, R. I.

Scott's Coast Pilot, FOR
Great Lakes and Connecting Waters.

AT \$1.50,

For sale by the MARINE REVIEW.

LONG LIFTS
WIDE RANGE
SELLERS' RESTARTING INJECTOR
LONG SERVICE
SIMPLEST AND BEST
RESTARTING
SELLERS' PHILA. PA.
16-A
**For Stationary, Portable,
 Traction Engines, Tugboats, &c.**
Thoroughly Reliable—Perfectly Automatic.
JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.

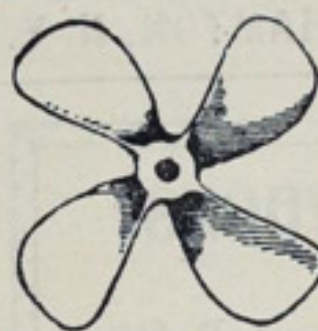
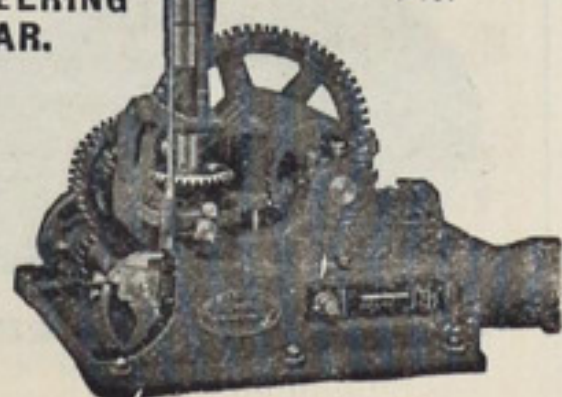


**SIMPLE,
 STRONG
 and
 RELIABLE.**

Changed from
 Steam to
 Hand by one
 Lever in
 Less Than
 One Second

**No. 8
 BECK
 Patent
 Steam
 and Hand
 STEERING
 GEAR.**

**BUILT BY
 Pawling &
 Harnischfeger,
 MILWAUKEE
 WIS.**



MacKinnon Manufacturing Co.

Boiler Makers, Founders and Machinists.

Marine Boilers, Engines and Shipyard Machinery. Most
 powerful set of Hydraulic Slings on the Lakes. Best
 Towing and Speed Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.

Works and office. 224-230 N. Water St.

BAY CITY, MICH.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors
 Consolidated Cork Life Preservers. Superior to all others. Ring Buoys and Fenders.

SAFEST, CHEAPEST. Approved and adopted by U. S.
 Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River
 Steamer Lines as the only Reliable Life Preserver. Vessels
 and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition



**Metallic
 and
 Wooden
 Life
 Belts.**



Metallic Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the
 lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue.

D. KAHNWEILER,

Get our prices before buying elsewhere.

437 Pearl Street, NEW YORK CITY.

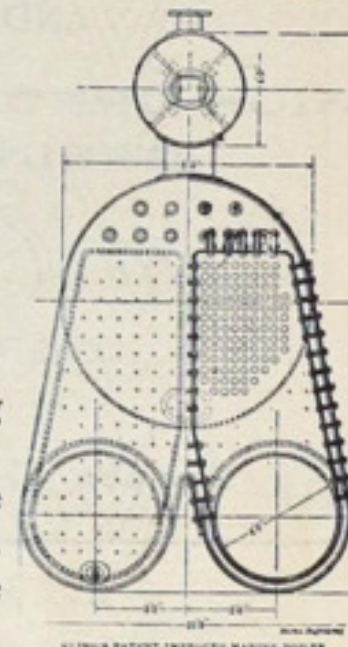
The Kling Marine Boiler.

**LIGHT WEIGHT.
 RAPID STEAMING.
 PERFECT CIRCULATION.
 BURNS ANY FUEL.**

Will give greater economy and larger steaming
 radius over older types of boiler.

Vessel owners cannot afford to overlook one of the
 prime factors of cost in transportation—the fuel bill.
 Fuel bills with our boilers are only two-thirds the
 bills of ordinary boilers.

KLING BROS., Boiler Makers, 287 Hawthorne Ave.,
CHICAGO, ILL.



SHERIFFS STEAM STEERER.

MADE IN TWO SIZES

Are easy to adjust and can
 be handled by any one.

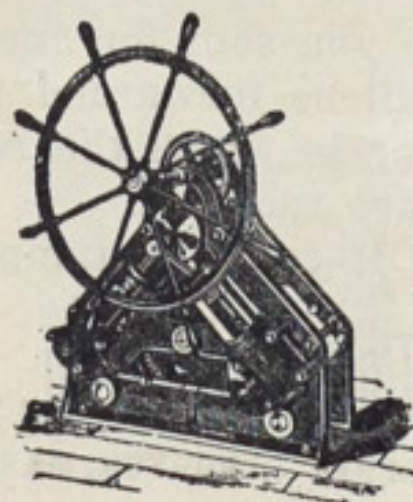
The Steerer can be arranged
 to set in pilot house or aft.

No Steerer will be sold with-
 out a quadrant.

Steerer will be sold on ap-
 proval.

Manufactured by
SHERIFFS MFG. CO.

**126-130 Barclay Street,
 MILWAUKEE, WIS.**

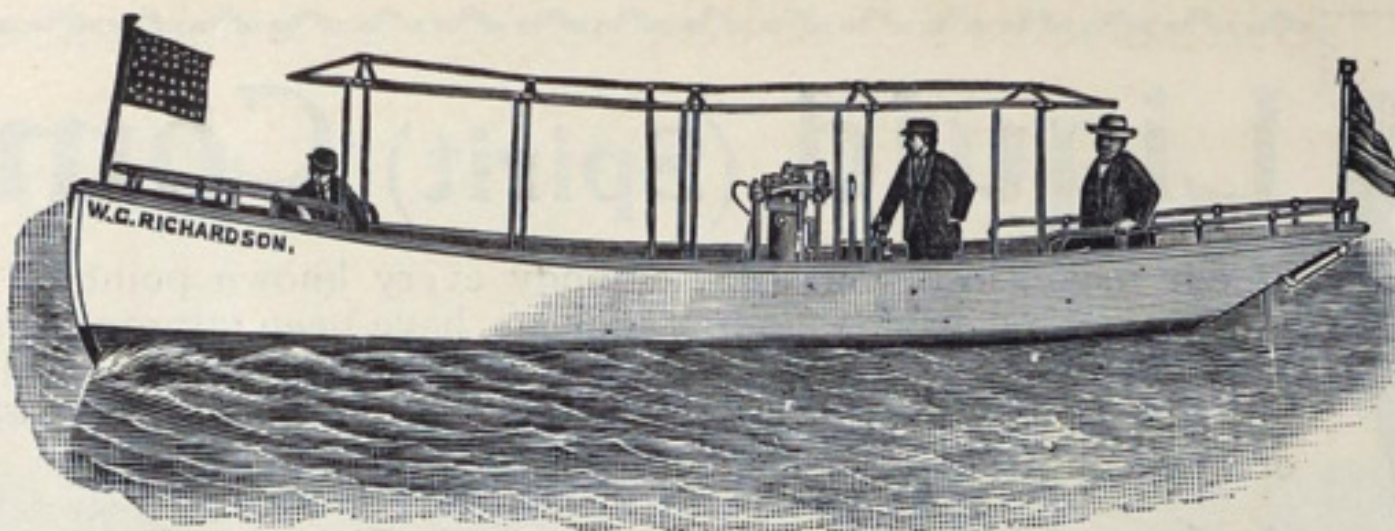


The Wootters Gas Engine.

Especially adapted for launches and ferry boats. Fitted with friction clutch or reversible shaft.

These engines are giving entire satisfaction in the pleasure yacht W. C. Richardson and the delivery launch Lotta.

Prices and particulars furnished on application.



NAPHTHA LAUNCH W. C. RICHARDSON, (Engine 8 horse power—speed 8 miles an hour.)

BUILT BY THE McMYLER MFG. CO., GAS ENGINE DEPARTMENT, 180 Columbus St., CLEVELAND, O.

Suitable for all purposes requiring from 1 to 200 horse-power, with the lowest possible expenditure.

Engines of the stationary type built for every purpose where a reliable and efficient power is required.

THE Swain Wrecking Co.
L. C. WALDO, Pres.

The TUG FAVORITE
STATIONED AT CHEBOYGAN MICH.
WITH COMPLETE WRECKING OUTFIT
IN CHARGE OF
Capt. P. L. MILLEN

THE CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH.
ENABLES US TO WRECK IN CANADIAN WATERS

STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF
JOHN S. QUINN
Address all communications to
PARKER & MILLEN
OFFICE
151 WATER ST. WEST
DETROIT, MICH.

4 STEAM PUMPS, 10 JACKS, 3 HAWKERS.

1 COAL AND ORE PUMP
3-12 INCH ROTARY,
1-14 INCH WORTHINGTON

DIVING RIGS
AND
DIVERS
ABOARD
AT
ALL TIMES

1898 DECEMBER 1898						
SUN	MON	TUES	WED	THUR	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9

Telegraph
Capt. P. L. MILLEN
CHEBOYGAN, MICH.

TELEGRAPH
PARKER & MILLEN,
DETROIT, MICH.

**STANDARD AUTOMATIC
RELEASING HOOK**

For NAPHTHA LAUNCHES and boats
of all sizes and descriptions.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on. For further information apply to

STAND'T AUT. RELEAS'G HOOK CO.,
22 and 24 State Street, New York.

KATZENSTEIN'S Self-Acting METAL PACKING,

For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also **METAL GASKETS** for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

PHOTOGRAPHS OF LAKE AND OCEAN SHIPS.

We have negatives of nearly all large ships on the lakes. Sizes range from 7 1/2 x 9 inches to 11 x 14 inches; prices from 75 cents to \$1.25. The large prints, 11 x 14 inches picture size, are the finest ever made on the lakes.

MARINE REVIEW,
418-419 Perry-Payne Bldg., Cleveland.

DOCK and DECK HOISTS
ALL KINDS OF
Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH,
SAGINAW, MICH.

WILSON & SILSBY, Rowe's Wharf,
BOSTON, MASS.

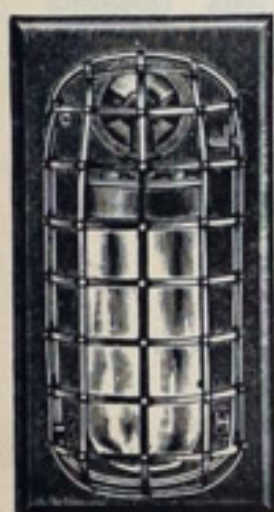
We furnished the Sails for
DEFENDER,
COLONIA,
JUBILEE,
NAVAHOE.

PARTICULAR ATTENTION GIVEN TO
SAILS FOR RAGING YACHTS.
ALSO THE
OUTFITS OF LARGE STEAM YACHTS.

Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well-made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

JENKINS BROTHERS, NEW YORK, PHILADELPHIA, BOSTON, CHICAGO.



Ship Lamps

OIL AND ELECTRIC FIXTURES

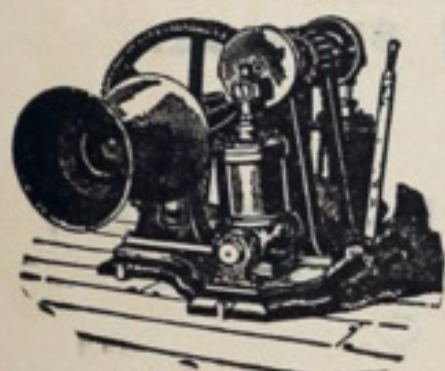
FOR
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.

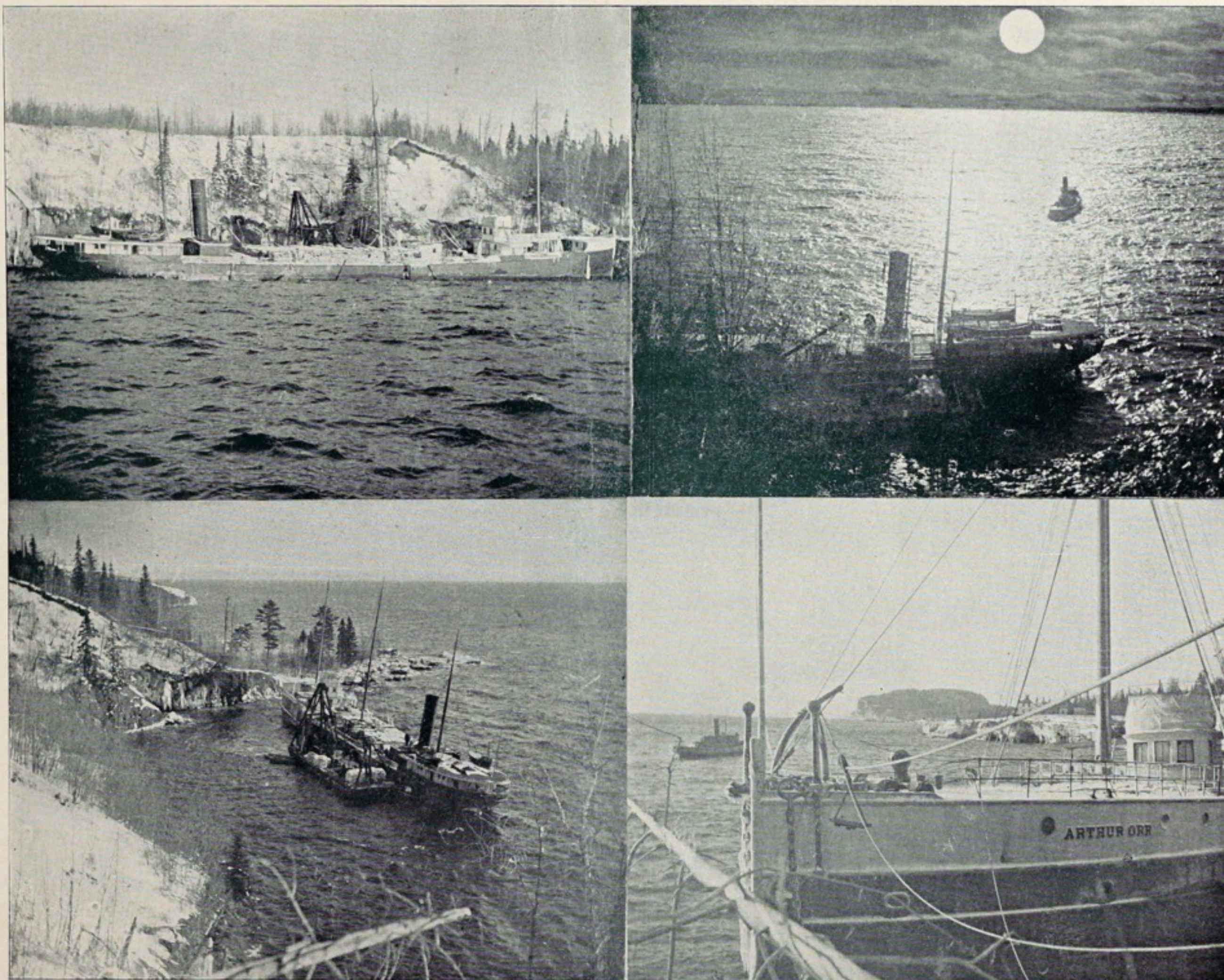


Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., Bay City, Michigan.

U. S. Engineer Office, Duluth, Minn.,
Nov. 19, 1898. Sealed proposals for
building pile and timber revetments for
Ship Canals across Keweenaw Point,
Mich., will be received here until noon,
Dec. 20, 1898, and then publicly opened.
Information furnished on application here
or at branch office, Houghton, Mich. Clin-
ton B. Sears, Major, Engrs. Dec. 15,



STEEL LAKE FREIGHTER STRANDED ON THE NORTH SHORE OF LAKE SUPERIOR.

VIEWS OF THE CHICAGO STEAMER ARTHUR ORR, ASHORE AT BAPTISM RIVER NOV. 21 TO DEC. 1, 1898.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, published by the Marine Review, 418-419 Perry-Payne Bldg., Cleveland.
See accompanying index of advertisers for full addresses of concerns in this directory.

ARTIFICIAL DRAFT FOR BOILERS.

Detroit Dry Dock Co.....Detroit.
B. F. Sturtevant Co.....Boston.
Globe Iron Works Co.....Cleveland.
H. Bloomsburg & Co.....Newport News, Va.

ADJUSTERS OF INSURANCE.

Johnson & Higgins.....Buffalo.
Chas. E. & W. F. Peck.....Chicago.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

ANTI-FRICTION METALS.

Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Wm. Cramp & Sons.....Philadelphia.

ASBESTOS.

H. W. Johns Mfg. Co.....New York.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Harvey L. Brown.....Buffalo.
Harvey D. Goulder.....Cleveland.
Albert J. Gilchrist.....Cleveland.
Orestes C. Pinney.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
White, Johnson, McCaslin & Cannon.....Cleveland.
Mackey & Bell.....Buffalo.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
Detroit Screw Works.....Detroit.
Farrar & Trefts.....Buffalo.
Wm. Cramp & Sons.....Philadelphia.
W. & A. Fletcher Co.....Hoboken, N. J.
Gas Engine & Power Co.....Morris Heights, N. Y.
Mackinnon Mfg. Co.....Bay City, Mich.
Babcock & Wilcox Co.....New York.
Roberts Safety Water Tube Boiler Co.....New York.
S. F. Hodge & Co.....Detroit.
Kling Bros.....Chicago.
Chicago Ship Building Co.....Chicago.
Dry Dock Engine Works.....Detroit.
Cleveland Ship Building Co.....Cleveland.
Globe Iron Works Co.....Cleveland.
Pusey & Jones Co.....Wilmington, Del.
Newport News Ship Bldg. Co.....Newport News, Va.

BOILER CIRCULATORS.

H. Bloomsburg & Co.....Newport News, Va.

BOILER PLATES.

Bourne-Fuller Co.....Cleveland.

BOILER TUBES, SEAMLESS, COLD DRAWN.

Shelby Steel Tube Co.....Cleveland.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works.....New York.

BOILER AND PIPE COVERING.

H. W. Johns Mfg. Co.....New York.

BOILER STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BUCKETS, ORE AND COAL.

McMyler Mfg. Co.....Cleveland.

Brown Hoisting & Conveying Mach. Co.....Cleveland.

BEAM ENGINES.

W. & A. Fletcher Co.....Hoboken, N. J.

BLOCK MANUFACTURERS.

Cleveland Block Co.....Cleveland.

BLOWERS FOR FORCED DRAFT.

American Blower Co.....Detroit.

B. F. Sturtevant Co.....Boston.

BAROMETERS, MARINE GLASSES, ETC.

John Bliss & Co.....New York.

Also most of the ship chandlers.

BOAT BUILDERS.

Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.

Thos. Drein & Son.....Wilmington, Del.

BROKERS.

See Vessel Agents.

BOLTS-HOLLOW SAFETY STAYBOLTS.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Chas. Cory & Son.....New York.

Standard Brass Works.....Kalamazoo, Mich.

Wm. Cramp & Sons.....Philadelphia.

Magnolia Metal Co.....New York.

Detroit Sheet Metal & Brass Works.....Detroit.

BRIDGES, BUILDINGS, STRUCTURAL WORK.

Berlin Iron Bridge Co.....East Berlin, Conn.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CHAINS.

P. Hayden S. H. Co.....Columbus, O.

James McKay & Co.....Pittsburgh, Pa.

J. B. Carr Co.....Troy, N. Y.

Lebanon Chain Works.....Lebanon, Pa.

CLASSIFICATION OF VESSELS.

Great Lakes Register.....Chicago.

COAL SHIPPERS.

Cuddy-Mullen Coal Co.....Cleveland.

M. A. Hanna & Co.....Cleveland.

Pickands, Mather & Co.....Cleveland.

Rochester & Pittsburgh Coal & Iron Co.....Buffalo.

Pittsburgh & Chicago Gas Coal Co.....Cleveland.

Osborne, Saeger & Co.....Cleveland.

Castner, Curran & Bullitt.....Philadelphia.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting & Conveying Mach. Co.....Cleveland.

McMyler Mfg. Co.....Cleveland.

Lidgerwood Mfg. Co.....New York.

COMPASSES.

John Bliss & Co.....New York.

L. Black & Co.....Detroit.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

COPPER AND SHEET IRON WORK.

Detroit Sheet Metal & Brass Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.

COMPASS ADJUSTER.

Geo. A. Simpson.....Sault Ste. Marie, Mich.

CRANES.

Brown Hoisting & Conveying Mach. Co.....Cleveland.
McMyler Mfg. Co.....Cleveland.
Lidgerwood Mfg. Co.....New York.

CONDENSERS.

See pumps.

CONTRACTORS FOR PUBLIC WORKS.

Cleveland Dredge Co.....Cleveland.

CORDAGE.

See ship chandlers.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburgh, Pa.

DIVING APPARATUS.

A. J. Morse & Son.....Boston.

DREDGING AND DOCK CONTRACTORS.

Cleveland Dredge Co.....Cleveland.

DRY DOCKS.

American Steel Barge Co.....West Superior, Wis.
Chicago Ship Building Co.....Chicago.
Wm. Cramp & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Detroit Dry Dock Co.....Detroit.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Bldg. Co.....Newport News, Va.
Pusey & Jones Co.....Wilmington, Del.
Ship Owners' Dry Dock Co.....Cleveland.
Cleveland Ship Building Co.....Lorain.
Union Dry Dock Co.....Buffalo.

ENGINE BUILDERS, MARINE.

Farrar & Trefts.....Buffalo.
W. & A. Fletcher Co.....Hoboken, N. J.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
S. F. Hodge & Co.....Detroit.
Mackinnon Mfg. Co.....Bay City, Mich.
Pusey & Jones Co.....Wilmington, Del.
Newport News Ship Bldg. Co.....Newport News, Va.
Wm. Cramp & Sons.....Philadelphia.
Roach's Ship Yard.....Chester, Pa.
B. F. Sturtevant Co.....Boston.
Globe Iron Works Co.....Cleveland.
Cleveland Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
H. G. Trout.....Buffalo.
Dry Dock Engine Works.....Detroit.
American Steel Barge Co.....West Superior, Wis.
Chicago Ship Building Co.....Chicago.
Sheriffs Mfg. Co.....Milwaukee.

ENGINE ROOM TELEGRAPH.

Chas. Cory & Son.....New York.
Chadburn & Son.....11 Waterloo Rd., Liverpool.

ENGINEERS' SUPPLIES.

Detroit Sheet Metal & Brass Works.....Detroit.
Chase Machine Co.....Cleveland.

ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co.....Schenectady, N. Y.
B. F. Sturtevant Co.....Boston.

ELECTRIC HOISTS.

General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.

ENGINEERS, CONSULTING (MECHANICAL AND MARINE).

Miers Coryell.....New York.
John Haug.....Philadelphia.
Ambrose V. Powell.....Chicago.
W. J. Wood.....Chicago.
Gustav Hillman.....Brooklyn.
Walter Miller.....Cleveland.
Joseph R. Oldham.....Cleveland.

FORGES FOR RIVET HEATING.

Crumlish Forge Co.....Buffalo.

FANS FOR VENTILATION.

American Blower Co.....Detroit.
B. F. Sturtevant Co.....Boston.

FEED WATER PURIFIER AND HEATERS.

Robert Learmonth.....Buffalo.

FORGINGS, IRON AND STEEL.

Cleveland City Forge & Iron Co.....Cleveland.
Bethlehem Iron Co.....South Bethlehem.
Bourne-Fuller Co.....Cleveland.

FLUSHOMETERS.

Kenney Co., The.....New York.

FORWARDERS OF FREIGHT.

Thomas Wilson.....Cleveland.
C. H. Tucker.....Cleveland.
Bessemer Steamship Co.....Cleveland.

FUELING COMPANIES AND COAL DEALERS.

Cuddy-Mullen Coal Co.....Cleveland.
James Graham & Co.....Detroit.
M. A. Hanna & Co.....Cleveland.
Mark H. Hanlon.....Cleveland.
Pickands, Mather & Co.....Cleveland.
O. S. Richardson Fueling Co.....Chicago.
Stanley B. Smith & Co.....Detroit.
Pittsburgh & Chicago Gas Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Port Royal Dock Co.....Sault Ste. Marie, Mich.
Youghiogheny & Lehigh Coal Co.....Chicago.
Osborne, Saeger & Co.....Cleveland.
Castner, Curran & Bullitt (Pocahontas).....Philadelphia.

FLAGS AND BUNTING.

See ship chandlers.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Wm. Porter's Sons.....New York.
Page Bros. & Co.....Boston.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS ENGINES.

McMyler Mfg. Co.....Cleveland.

GLASSES, MARINE.

See ship chandlers and nautical instruments.

GAUGES, STEAM.

Crosby Steam Gauge & Valve Co.....Boston.

See also valves and engineers' supplies.

GRAPHITE.

Joseph Dixon Crucible Co.....Jersey City, N. J.

GREASE CUPS.

See engineers' supplies.

HEATERS, STEAM.

American Blower Co.....Detroit.

HARDWARE, MARINE.

L. W. Ferdinand & Co.....Boston.

Detroit Sheet Metal & Brass Works.....Detroit.

HOISTING ENGINES.

Chase Machine Co.....Cleveland.
S. F. Hodge & Co.....Detroit.
Jackson & Church.....Saginaw.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co.....Bay City.
Globe Iron Works Co.....Cleveland.
Williamson Bros.....Philadelphia.
Hyde Windlass Co.....Bath, Me.

HOSE FOR DECK AND FIRE PURPOSES.

The Manhattan Rubber Mfg. Co.....New York, Cleveland and Chicago.

HAMMERS, POWER DROP.

Chase Machine Co.....Cleveland.

INDICATORS, CALL BELLS.

Chas. Cory & Son.....New York.
Chadburn & Son.....11 Waterloo Rd., Liverpool.

INJECTORS.

Jenkins Bros.....New York.

INSURANCE, MARINE.

Chas. E. & W. F. Peck.....New York and Chicago.
Johnson & Higgins.....Main office in New York.

Insurance Co. of North America, represented by

Geo. L. McCurdy.....Chicago.

Brown & Co.....Buffalo.

C. W. Elphicke & Co.....Chicago.

J. G. Keith & Co.....Chicago.

La Salle & Co.....Duluth.

Parker & Millen.....Detroit.

Mitchell & Co.....Cleveland.

W. C. Richardson.....Cleveland.

Hawgood & Moore.....Cleveland.

John Gordon & Co.....Buffalo.

Drake & Maytham.....Buffalo.

Hutchinson & Co.....Cleveland.

C. R. Jones & Co.....Cleveland.

J. H. Bartow.....Cleveland.

IRON ORE AND PIG IRON.

M. A. Hanna & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

Bourne-Fuller Co.....Cleveland.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.

Armstrong Cork Co.....Boston.

Detroit Sheet Metal & Brass Works.....Detroit.

Thos. Drein & Son.....Wilmington, Del.

D. Kahnweiler.....New York.

LIFE-SAVING LINE-CARRYING GUN.

Wm. Read & Sons.....Boston.

LIGHTS, PORTABLE, SELF-CONTAINED.

The Wells Light Mfg. Co.....New York.

LIGHTS, SIDE AND SIGNAL.

Page Bros. & Co.....Boston.

Wm. Porter's Sons.....New York.

MANILA ROPE.

Upson-Walton Co.....Cleveland.

H. H. Baker & Co.....Buffalo.

METALLIC PACKING.

U. S. Metallic Packing Co.....Philadelphia.

L. Katzenstein & Co.....New York.

MARINE TELEGRAPH.

Chas. Cory & Son.....New York.

Chadburn & Son.....11 Waterloo Rd., Liverpool.

METALS FOR BEARINGS.

Magnolia Metal Co.....New York.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Wm. Cramp & Sons.....Philadelphia.

MAGNOLIA METAL.

Magnolia Metal Co.....New York.

METALLIC LIFE BOATS.

Thos. Drein & Son.....Wilmington, Del.
D. Kahnweiler.....New York.

MARINE GLUE.

L. W. Ferdinand & Co.....Boston.

NAUTICAL INSTRUMENTS.

John Bliss & Co.....New York.

Also most of the ship chandlers.

NAPHTHA LAUNCHES.

Gas Engine & Power Co.....New York.

NAUTICAL SCHOOL.

Chicago Nautical School.....Chicago.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

NAVAL ARCHITECTS.

Frank E. KirbyDetroit.
W. J. WoodChicago.
Gustav HillmanBrooklyn.
John HaugPhiladelphia.
Joseph R. OldhamCleveland.
Robert CurrCleveland.

OAK TIMBER AND PLANK.

Martin-Barriss Co.Cleveland.

OILS AND LUBRICANTS.

Jos. Dixon Crucible Co.Jersey City, N. J.
Lake Carriers' Oil Co.Cleveland.
Standard Oil Co.Cleveland.

PATENT ATTORNEYS.

Thurston & BatesCleveland.
Wm. M. MonroeCleveland.

PNEUMATIC TOOLS.

Chicago Pneumatic Tool Co.Chicago.

POCAHONTAS COAL.

Castner, Curran & BullittPhiladelphia.

PROPELLER WHEELS.

Dry Dock Engine WorksDetroit.
Cleveland Ship Building Co.Cleveland.
Globe Iron Works Co.Cleveland.
Farrar & TreftsBuffalo.
Newport News Ship Bldg. Co.Newport News, Va.
Pusey & Jones Co.Wilmington, Del.
S. F. Hodge & Co.Detroit.
Wm. Cramp & SonsPhiladelphia.
Phosphor Bronze Smelting Co., Ltd.Philadelphia.
Mackinnon Mfg. Co.Bay City.
Sheriffs Mfg. Co.Milwaukee.
H. G. TroutBuffalo.
Hyde Windlass Co.Bath, Me.

PRESSURE REGULATORS AND REDUCING VALVES.

G. M. Davis & Co.Chicago.
Foster Engineering Co.Newark, N. J.

PIPE, WROUGHT IRON.

Bourne-Fuller Co.Cleveland.

PACKING.

A. W. Chesterton & Co.Boston.
H. W. Johns Mfg. Co.New York.
Jenkins Bros.New York.
L. Katzenstein & Co.New York.
Manhattan Rubber Mfg. Co.New York.
U. S. Metallic Packing Co.Philadelphia.
Peerless Rubber Mfg. Co.New York.

PAINTS.

Upson-Walton Co.Cleveland.
Howard H. Baker & Co.Buffalo.

PUMPS, STEAM.

Geo. F. Blake Mfg. Co.New York.
Henry R. Worthington.New York.
Davidson, M. T.Brooklyn, N. Y.

PUMPS, ELECTRIC.

General Electric Co.Schenectady, N. Y.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Aut. Releasing Hook Co.New York.

RIVETS, STEEL.

Bourne-Fuller Co.Cleveland.

RUBBER GOODS FOR STEAMERS.

Manhattan Rubber Mfg. Co.New York and Cleveland.
Peerless Rubber Mfg. Co.New York.

RUBBER INSULATED WIRES.

John A. Roebling's Sons.New York and Cleveland.

SAIL MAKERS.

Wilson & SilsbyBoston.
Howard H. Baker & Co.Buffalo.
Upson-Walton Co.Cleveland.

SHIP PLATES AND SHAPES, STEEL.

Bourne-Fuller Co.Cleveland.

SALVAGE COMPANIES.

See wrecking companies.

STAYBOLT IRON, Hollow and Solid.

Falls Hollow Staybolt Co.Cuyahoga Falls, O.

SEARCH LIGHTS.

General Electric Co.Schenectady, N. Y.

STEAMSHIP LINES, PASS. AND FREIGHT.

Cleveland & Buffalo Transit Co.Cleveland.
Detroit & Cleveland Navigation Co.Detroit.
Goodrich Transportation Co.Chicago.
Lackawanna-Green Bay Line, C. H. Tucker.Cleveland.

Lake Michigan & Lake Superior Trans. Co.Chicago.

Northern Steamship Co.Ogdensburg, N. Y.

Ogdensburg Transit Co.Ogdensburg, N. Y.

Northern Transit Co.Cleveland.

Graham & Morton Trans. Co.Chicago.

SURVEYORS, MARINE.

Robert CurrCleveland.
Capt. D. McLeodCleveland.
Joseph R. OldhamCleveland.

SHIP CHANDLERS.

Howard H. Baker & Co.Buffalo.
Upson-Walton Co.Cleveland.

STEAM, VACUUM AND HYDRAULIC SPECIAL-TIES.

William CraigNew York.

SHIP BUILDERS.

American Steel Barge Co.West Superior, Wis.
Craig Ship Building Co.Toledo, O.
Chicago Ship Building Co.Chicago.
Detroit Dry Dock Co.Detroit.
Wm. Cramp & SonsPhiladelphia.
Newport News Ship Bldg. Co.Newport News, Va.
Cleveland Ship Building Co.Cleveland.
Globe Iron Works Co.Cleveland.
Roach's Ship Yard.Chester, Pa.
Pusey & Jones Co.Wilmington, Del.
Union Dry Dock Co.Buffalo.

STOCKLESS ANCHORS.

Baldt Anchor Co.Chester, Pa.
International Anchor Co.Cleveland.

STEERING ENGINES.

Pawling & HarnischfegerMilwaukee.
Sheriffs Mfg. Co.Milwaukee.
Chase Machine Co.Cleveland.
Globe Iron Works Co.Cleveland.
Williamson Bros.Philadelphia.
Hyde Windlass Co.Bath, Me.

STEAM VESSELS FOR SALE.

Samuel HolmesNew York.

TRAPS, STEAM.

Wm. S. Haines Co.Philadelphia.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Bement, Miles & Co.Philadelphia.
Chicago Pneumatic Tool Co.Chicago.
Hilles & Jones Co.Wilmington, Del.
New Doty Mfg. Co.Janesville, Wis.

TOWING MACHINES.

American Ship Windlass Co.Providence, R. I.

TOWING COMPANIES.

Barry Bros. Independent Tug Line.Chicago.
Escanaba Towing & Wrecking Co.Escanaba, Mich.
The Vessel Owners' Towing Co.Cleveland.
Dunham Towing & Wrecking Co.Chicago.

TUBING, COPPER AND BRASS.

Randolph & ClowesWaterbury, Conn.

TRIMMING DEVICE FOR ORE CARRIERS.

Mack, Wm. H.Cleveland.

VALVES.

Crosby Steam Gauge & Valve Co.Boston.
Jenkins Bros.New York.
G. M. Davis Co.Chicago.
Foster Engineering Co.Newark, N. J.

VESSEL AND FREIGHT AGENTS.

Brown & Co.Buffalo.
J. H. BartowCleveland.
Drake & MaythamBuffalo.
C. W. Elphicke & Co.Chicago.
John Gordon & Co.Buffalo.
Hawgood & MooreCleveland.
Hutchinson & Co.Cleveland.
C. R. Jones & Co.Cleveland.
Mitchell & Co.Cleveland.
W. C. RichardsonCleveland.
Samuel HolmesNew York.

WIRE ROPE.

John A. Roebling's Sons.New York and Cleveland.
Upson-Walton Co.Cleveland.
H. H. Baker & Co.Buffalo.
Phosphor Bronze Smelting Co., Ltd.Philadelphia.

WHISTLES, STEAM.

Crosby Steam Gauge & Valve Co.Boston.

WINDLASSES.

American Ship Windlass Co.Providence, R. I.
Hyde Windlass Co.Bath, Me.
Globe Iron Works Co.Cleveland.

WINCHES.

American Ship Windlass Co.Providence, R. I.
Hyde Windlass Co.Bath, Me.

WRECKING AND SALVAGE COMPANIES.

Escanaba Towing & Wrecking Co.Escanaba, Mich.
Donnelly Salvage & Wrecking Co.Kingston, Ont.
Swain Wrecking Co.Detroit.
Vessel Owners' Towing Co.Cleveland.
Dunham Towing & Wrecking Co.Chicago.

YACHT BOILERS.

Detroit Screw WorksDetroit.

YACHT PLUMBERS.

Alfred B. Sands & SonNew York.

YACHT SAILS.

Wilson & SilsbyBoston.

YACHT AND BOAT BUILDERS.

Thos. Drein & SonWilmington, Del.
Gas Engine & Power Co.New York.

YACHT, BOAT AND CANOE HARDWARE.

L. W. Ferdinand & Co.Boston.

YAWLS.

Thos. Drein & SonWilmington, Del.

Alphabetical List of Marine Review Advertisers.

The star (*) indicates that the advertisement appears alternate weeks.

Almy Water Tube Boiler Co. 22	Davidson, M. T. 21	Jones, C. R. & Co. 4	Pickands, Mather & Co. 21
American Blower Co. 28	Detroit Sheet Metal & Brass Works 19	Kahnweiler, D. 22	Pinney, Orestes C. 4
American Ship Windlass Co. 2	Dixon, Jos., Crucible Co. 21	Katzenstein, L. & Co. 23	Pittsburgh & Chicago Gas Coal Co. 19
American Steel Barge Co. 7	Donnelly Salvage & Wrecking Co. 7	*Kenney Co., The, New York. 8	Powell, Ambrose V. 4
Armstrong Cork Co. 28	Drake & Maytham. 4	Kelth, J. G. & Co. 18	Port Royal Dock Co. 5
Babcock & Wilcox Co. 7	Drein, Thos. & Son. 19	Kling Bros., Chicago. 22	Porter's, Wm., Sons. 19
Baldt Anchor Co. 20	Dry Dock Engine Works. 3	Lackawanna-Green Bay Line. 4	Pusey & Jones Co. 18
Barry Bros. Independent Tug Line. 7	Dunham Towing & Wrecking Co. 27	Lebanon Chain Works. 18	Randolph & Clowes. 1
Baker, Howard H. & Co. 21	Elphicke, C. W. & Co. 4	L. S. & M. S. Ry. 27	*Read & Sons, Wm. 17
Bartow, J. H. 4	Eophone Co. 5	*Lake Carriers' Oil Co. 20	Richardson, W. C. 4
Bement, Miles & Co. 22	Escanaba Towing & Wrecking Co. 19	La Salle & Co. 18	Richardson, O. S., Fueling Co. 5
Berlin Iron Bridge Co. 22	Farrar & Trefts. 27	*Learnmonth, Robert. 24	Roach's Ship Yard. 18
Bessemer Steamship Co. 18	Falls Hollow Staybolt Co. 6	Lidgerwood Mfg. Co. 6	Roberts Water Tube Boiler Co. 19
Bethlehem Iron Co. 6	Farasey & Marron. 23	McKay, James & Co. 17	*Roebling's, John A., Sons Co. 28
Bourne-Fuller Co. 8	Ferdinand, L. W. & Co. 21	McLeod, D. 4	Rochester & Pittsburgh Coal & Iron Co. 5
Blake, Geo. F., Mfg. Co. 19	Fletcher, W. & A. Co. 28	McMyler Mfg. Co. 23	Safety Car Heating & Lighting Co. 20
*Bliss, John & Co. 24	*Foster Engineering Co. 8	Mackinnon Mfg. Co. 22	Sands, Alfred B. & Son. 22
Bloomsburg, H. & Co. 7	Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. 20	Magnolia Metal Co. 1	Sheriffs Mfg. Co. 22
Brown & Co. 18	General Electric Co. 6	Manhattan Rubber Mfg. Co. 18	Shelby Steel Tube Co. 5
Brown & Co. 4	Gilchrist, Albert J. 4	Marine Iron Co. 23	Ship Owners' Dry Dock Co. 28
Brown Holsting & Conveying Machine Co. 2	Globe Iron Works Co. 1	Martin-Barriss Co. 21	Smith, Stanley B., & Co. 17
Brown, Harvey L. 4	Goulder, Harvey D. 4	Miller, Walter. 20	Standard Oil Co. 24
Carr, J. B. Co. 21	Gordon, John & Co. 4	Monroe, Wm. M. 4	Standard Brass Works. 18
Castner, Curran & Bullitt. 27	Graham, James & Co. 5	Mackey & Bell. 4	Standard Automatic Releasing Hook Co. 23
*Chesterton, A. W. & Co. 20	Haines, Wm. S. & Co. 8	Milwaukee Dry Dock Co. 28	Sturtevant, B. F. Co. 28
*Chadburn & Sons. 28	Hanna, M. A. & Co. 19	Mitchell & Co. 4	Swain Wrecking Co. 23
Chase Machine Co. 6	Hanlon, Mark H. 5	Morse, A. J. & Son. 22	
Chicago Pneumatic Tool Co. 20	Haug, John. 4	Mack, Wm. H. 27	
Chicago Ship Building Co. 2	Hawgood & Moore. 4		
Cleveland City Forge & Iron Co. 7	Hayden, P. S. H. Co. 19		
Cramp, Wm., & Sons. 1	Herriman, F. D. 18		
Cleveland Ship Building Co. 1	*Hilles & Jones Co. 6		
C. C. C. & St. L. Ry. 27	Hillman, Gustav. 4		
Continental Iron Works. 2	Hodge, S. F. & Co. 7		
Coryell, Miers. 4	Holmes, Samuel. 4		
Cory, Chas. & Son. 22	Hoyt, Dustin & Kelley. 4		
*Craig Ship Building Co. 24	Hutchinson & Co. 4		
Craig, William. 20	Hyde Windlass Co. 28		
Crosby Steam Gauge & Valve Co. 8	Insurance Co. of North America. 18		
Cuddy-Mullen Coal Co. 5	International Anchor Co. 21		
Chicago Nautical School. 22	Jackson & Church. 23		
Curr, Robert. 4	Jenkins Brothers. 22-23		
Crumlish Forge Co. 18	Johns, H. W. Mfg. Co. 1		
Detroit Dry Dock Co. 1	Johnson & Higgins. 6		
Detroit Screw Works. 19			

WHAT DO YOU PAY

FOR A HORSE POWER?

THAT'S THE IMPORTANT QUESTION
AMONG SHIP OWNERS.

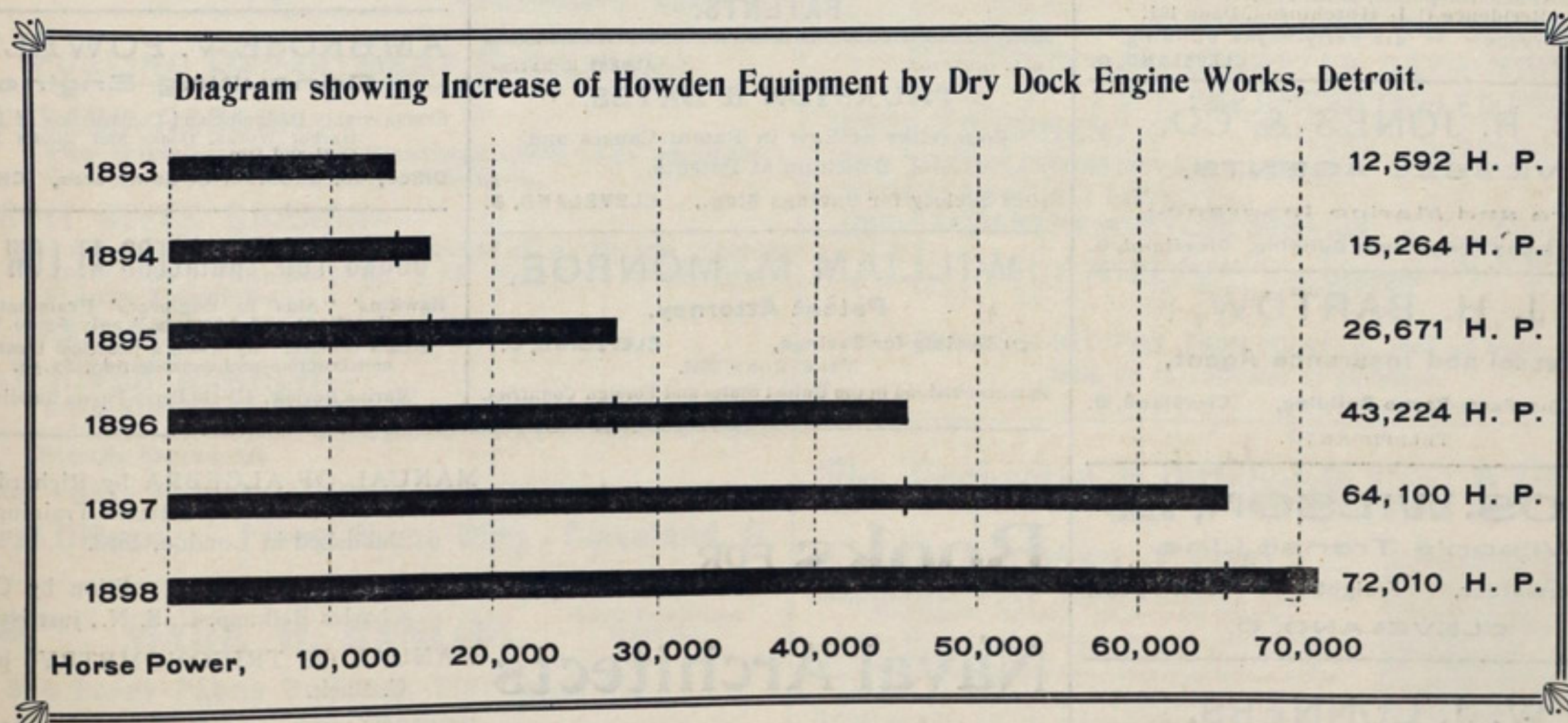
A UNIT OF POWER FOR A POUND AND A HALF OF COAL PER HOUR !

SUCH IS THE RECORD OF A MODERN FREIGHTER, THE WESTERN
TRANSIT CO.'S STEAMER TROY, EQUIPPED WITH
QUADRUPLE EXPANSION ENGINES AND

HOWDEN HOT DRAFT.

MORE ADDITIONS ARE MADE IN THE LIST OF HOWDEN SHIPS, REVISED TO DATE
IN THE FOLLOWING SUMMARY:

	STEAMERS.	HORSE POWER.
Total installations of Howden draft throughout the world,	825	2,313,600
Total installations by Dry Dock Engine Works, Detroit,	58	72,010



CONSULT DRY DOCK ENGINE WORKS, DETROIT, MICH.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.
General Insurance Agents,C. W. ELPHICKE. Room 10, No. 6 Sherman St.,
JAS. A. MYERS. CHICAGO, ILL.
CALVIN CARR.JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO.Vessel and Insurance Agents,
508, 509 & 510 Perry-Payne Building, Cleveland, O.
Office Telephone 767. Residence, John Mitchell, Doan 341.
John F. Wedow, 158 L. Alfred Mitchell, Doan 197 J.**W. C. RICHARDSON,**VESSEL AND MARINE INSURANCE AGENT,
Office Telephone 338. Residence Telephone 2938.
606 and 607 Perry-Payne Bldg., Cleveland, O.**BROWN & CO.**Vessel and Insurance Agents,
202 Main Street, Buffalo, N. Y.

W. A. HAWGOOD.

J. W. MOORE.

HAWGOOD & MOORE,Vessel and Insurance Agents,
Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395.
608 Perry-Payne Building, CLEVELAND, O.**JOHN GORDON & CO.**

Vessel, Freight and Insurance Agents,

JOHN GORDON. 1132 Guaranty Building,
J. H. KELLERAN. BUFFALO, N. Y.
H. L. CHAMBERLIN.CAPT. M. M. DRAKE, G. W. MAYTHAM,
Long Distance Telephone: Long Distance Telephone:
Office, Seneca 81. Office, Seneca 1660.
Residence, Bryant 431. Residence, 2615 Bryant.**DRAKE & MAYTHAM,**Vessel and Insurance Agents,
No. 1 Main Street, BUFFALO, N. Y.**LAKE TRANSPORTATION** C. H. TUCKER,
General Agent,LINES REPRESENTED The Northern Steamship Company,
Lackawanna Green Bay Line,
Ogdensburg Transit Co.
Office, Dock and Warehouse, Lake Front, Foot of Water Street.**HUTCHINSON & CO.**

Vessel and Insurance Agents.

Office Telephone, Main 2453.
Residence C. L. Hutchinson, Doan 19J.
C. L. HUTCHINSON. 412 Perry-Payne Building,
W. H. MCGEAN. CLEVELAND, O.**C. R. JONES & CO.**

VESSEL AGENTS,

Fire and Marine Insurance,
501, 502 & 503 Perry-Payne Building, Cleveland, O.**J. H. BARTOW,**

Vessel and Insurance Agent,

611 and 612 Perry-Payne Building, Cleveland, O.
TELEPHONE 717.**THOS. WILSON,** Managing
Owner

Wilson's Transit Line.

Gen. Forwarder, Freight and Vessel Agent,
CLEVELAND, O.**W. J. CONNERS,**OFFICES—
BUFFALO, Contractor,
CHICAGO,
MILWAUKEE,
GLADSTONE. BUFFALO, N. Y.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,
Steamship Offices,For Selling, Chartering and Building all classes Steam Vessels.
Steam Vessel Circulars. Weekly Freight Circulars.
Morris Building, 66 & 68 Broad Street, NEW YORK.

PROCTORS IN ADMIRALTY.

HARVEY D. GOULDER,Lawyer and Proctor in Admiralty,
CLEVELAND, O.**ALBERT J. GILCHRIST,**PROCTOR IN ADMIRALTY,
604 Perry-Payne Building, CLEVELAND, O.**HARVEY L. BROWN,**Counselor at Law and
Proctor in Admiralty,
35 White Building, BUFFALO, N. Y.**HOYT, DUSTIN & KELLEY,**LAWYERS and
PROCTORS IN ADMIRALTY,
Offices, 702 Western Reserve Bldg., Cleveland, O.**White, Johnson, McCaslin & Cannon,**ATTORNEYS AT LAW and
PROCTORS IN ADMIRALTY,
Blackstone Bldg., Cleveland O.**ORESTES C. PINNEY,**Lawyer and Proctor in Admiralty,
Rooms 316 and 317 Perry-Payne Building,
Telephone Main 2585. CLEVELAND, O.
W. F. MACKEY. URBAN C. BELL.**MACKEY & BELL,**ATTORNEYS AND COUNSELORS AT LAW,
PROCTORS IN ADMIRALTY.
1020-1022 PRUDENTIAL BLDG.,
BUFFALO, N. Y. TELEPHONE, SENECA 1314.

PATENTS.

E. L. THURSTON. ALBERT H. BATES.
THURSTON & BATES,
Counselors at Law in Patent Causes and
Solicitors of Patents,
1028 Society for Savings Bldg., CLEVELAND, O.**WILLIAM M. MONROE,**

Patent Attorney.

511 Society for Savings, CLEVELAND, O.
TELEPHONE 2683.
Patents obtained in the United States and Foreign Countries.

PROFESSIONAL.

W. J. WOOD, Naval Architect,
Ship Surveyor,
Consulting Engineer.Prepares designs or working drawings and specifications for
all classes of vessels and superintends construction and re-
pairs. Surveys damaged property and estimates cost of re-
pairs.Vessels designed—Twin S. S. Virginia, Steam Yacht Comanche,
Twin S. S. North West and North Land, I. W. Nicholas,
and many others, including Fire Boats, Tugs, Barges, etc.Complete plans furnished for
Steel Composite or Wooden Vessels.Office on Goodrich Dock, CHICAGO, ILL.
foot of Michigan Ave.,**MIERS CORYELL,**

Consulting Mechanical Engineer.

Plans, Specifications and Superintendence.
Marine and Water Works Engines and Boilers.

21 East Twenty-first Street, NEW YORK.

GUSTAV HILLMANN,

NAVAL ARCHITECT.

Designer of all classes of VESSELS.

470 Greene Ave., near Norstrand, Brooklyn, N. Y.

JOSEPH R. OLDHAM,

Engineer and Naval Architect.

Designs Steam Vessels, Marine Engines and Boilers,
and Superintends their Construction or Repairs.
814 Perry-Payne Building, CLEVELAND, O.**JOHN HAUG,**

Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their
Machinery.
Specialties—Bulk Oil Vessels, High Speed Yacht Engines, etc.
206 Walnut Place, PHILADELPHIA.**D. McLEOD,** MARINE SURVEYOR
and APPRAISEROf Damages and Losses on
Steel and Wooden Vessels.

713 Perry-Payne Bldg., - CLEVELAND, O.

ROBERT CURR,

SURVEYOR OF IRON AND STEEL HULLS.

PLANS AND SPECIFICATIONS FURNISHED,

418-419 Perry-Payne Bldg. CLEVELAND, O.
TELEPHONE 472.**AMBROSE V. POWELL, C.E.**

Consulting Engineer.

SPECIALTIES:—Designing and Construction of DRY DOCKS,
Harbor Works, Docks and Plants for Handling
Coal and Ore.

Office, 615 Chamber of Commerce, CHICAGO, ILL.

BOOKS FOR ENGINEERS AT LOW PRICES.

Hawkins' "Aids to Engineers' Examinations — With
Questions and Answers," only \$2.00.
"Steam Boilers," by Rose, a practical treatise on boiler
construction and examination, \$2.50.

Marine Review, 418-419 Perry-Payne Building, Cleveland.

MANUAL OF ALGEBRA by Richard C. Buck
of the Thames Nautical Training College.
Published in London, 1898.NAVIGATION. Revised edition by Commander
Charles Belknap, U. S. N., just issued.MANUAL OF TRIGONOMETRY, by Richard
C. Buck.RESISTANCE AND PROPULSION OF
SHIPS, by W. F. Durand.

These books at special prices for sixty days.

MARINE REVIEW, Cleveland.

Books FOR
Naval Architects
AT Cut Prices.

HAVE YOU TRIED OUR

SEAMLESS COLD DRAWN

Steel Boiler Tubes?

MANUFACTURED FROM

SOLID ROUND BAR—NO LAPS, SEAMS OR WELDS.

Cold Drawn Finish and Density of Metal prevent pitting and corroding.

Only Highest Grade of Material used. Sulphur and Phosphorus guaranteed not to exceed .025%.

Cold Drawing renders Metal very Tough, increases Tensile Strength and Elongation.

Tubes do not Split or Crack when re-rolled in Tube Sheet.

Correspondence

Solicited.

SEND US SAMPLE ORDER AND VERIFY ABOVE STATEMENTS.

SHELBY STEEL TUBE CO.,

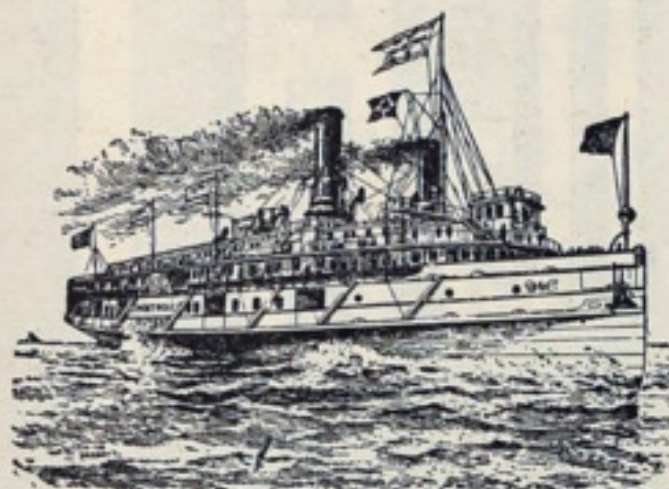
GENERAL SALES OFFICE,
American Trust Building,
Cleveland, O.

MILLS: Ellwood City, Pa., Shelby, Ohio., Greenville, Pa., Toledo, Ohio.

EASTERN OFFICE AND WAREROOMS: No. 144 Chambers St., New York, N. Y.

EUROPEAN OFFICE AND WAREROOMS: 29 Constitution Hill, Birmingham, England.

WESTERN OFFICE AND WAREROOMS: 135 Lake Street, Chicago, Ills.



SHIPPERS OF COAL BY RAIL AND WATER.

RAPID FUELING DOCKS, DETROIT RIVER.

JAMES GRAHAM & CO.,

Foot Twenty-first St., Detroit,

Below Routes of Passenger and Car Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL.

Large Supplies and every effort to give dispatch, day and night. Wide stretch of river for tows, and plenty of water at dock at all times.

Office 1008-9 Chamber of Commerce.

Long distance Telephone 2083.

W. S. Richardson Fueling Co.

FUELING DOCKS,
NORTH PIER
18th STREET BRIDGE.STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE. DIVISION ST. BRIDGE (NORTH BRANCH)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE (OGDEN CANAL)
SOUTH HALSTED ST. BRIDGE.**COAL**

OFFICE

225 DEARBORN ST.

CHICAGOGEO. F. LYNN,
TRAVELING SALESMAN.

Cuddy-Mullen Coal Co.

Miners and Shippers of Steam Coal

FUELING DEPARTMENT FACILITIES:

CLEVELAND HARBOR—

Car Dumper; Eight Pockets 1,000 tons capacity;
Three Steam Derricks; Lighter.

DETROIT RIVER BRANCH—

Amherstburg, Four Pockets and Three Steam
Derricks; Sandwich, 14 Pockets and Two
Steam Derricks.

ERIE, PA., BRANCH—Car Dumper.

SAULT RIVER BRANCH—

Two Docks at Detour (formerly known as the Anthony
and Watson Docks) Equipped with Pockets and
Steam Derricks.

Good Coal; Courteous Attention; Quick Dispatch.

General Offices: Perry-Payne Bldg., Cleveland, O.

Office Telephone,
Main 2658.**MARK H. HANLON,**Yard Telephone,
Main 386.

514 Perry-Payne Building, Cleveland, O.

Fueling Pockets.

For fueling vessels I have the management and control of the Osborne-Saeger pockets, located next to Cleveland Ship Bldg. Co.'s yard. Steamers coaled on short notice.

Fueling Lighter Reindeer.

This lighter is equipped with a clam shell bucket. Steamers fueled in any part of harbor or under the breakwater.

THE PORT ROYAL DOCK CO., SAULT STE. MARIE, MICH.

FUEL FOR STEAMERS.DOCK BELOW U.S. 500 LOCKS,
OPERATED DAY AND NIGHT.

STEAMERS FUELED PROMPTLY

DOCK EQUIPMENT

ONE TRAVELING MCMYLER DERRICK

WITH CLAM-SHELL BUCKET,

ONE STATIONERY MCMYLER DERRICK

PAUL H. McEVEY, MANAGER

TELEPHONE

STEAMERS CAN GET FUEL FROM POCKETS, each of which contains
from 25 to 150 tons at all times.

The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

Steamboat Fuel Dock. Blackwell Canal at
Michigan St. Bridge. 1400 feet dock frontage.Steam Elevator and 4 Steam Derricks. Steam Fuel
Scow, Capacity 550 Tons. Boats Coaled Day or Night.
Modern Car Dumping Machine; 18 cars per hour capacity.

OFFICE: 694 Ellicott Square Bldg., BUFFALO, N. Y.

TELEPHONES: Ellicott Square Bldg., Seneca 371 A.
Dock, Seneca 371 D.

Capt. WM. H. HAZEN,

Dock
Superintendent.



Electric Light and Power Plants

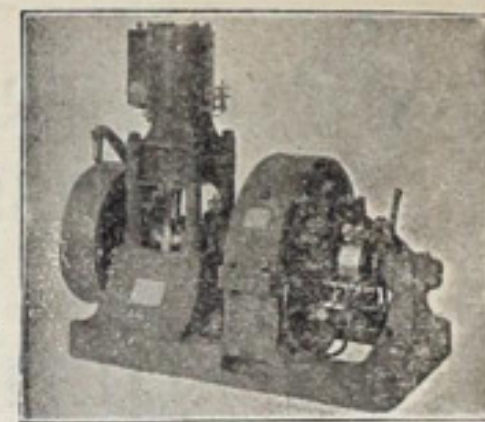
FOR STEAMSHIPS, YACHTS, DOCKS, WHARVES, WAREHOUSES, ETC.

DYNAMO AND ENGINE ON ONE BASE.

ELECTRIC HOISTS. WINCHES AND PUMPS. SEARCH LIGHTS.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y.

Also Offices on the principal Lakes and Seaports of the United States.



WELLS LIGHT

EDWARD ROBINSON, SOLE PROPRIETOR
46 WASHINGTON STREET, NEW YORK.

"WELLS LIGHT" REG.
WALL WORK & WELLS PATENTS

12,000 IN USE.

ESPECIALLY ADAPTED FOR
CONTRACTORS, QUARRIES, SHOVELS,
RAILROAD CONSTRUCTION, DREDGES,
BRIDGE & DOCK BUILDERS, WATER
WORKS, BRICK YARDS & COAL DOCKS.

800, 2,000 TO 4,000
CANDLE POWER FROM KEROSENE OIL.
PORTABLE, SELF-CONTAINED, AUTOMATIC,
UNAFECTED BY WEATHER,
400 RAILROADS
AND OVER 500 CONTRACTORS NOW USE WELLS LIGHT.

MARINE and NAVAL DESIGNS IN CALENDARS FOR 1899.

Engravings representing the Highest Attainments in Color Work.

All from recent Paintings. Send for samples and prices.

MARINE REVIEW, 418-419 PERRY-PAYNE BUILDING, CLEVELAND.

THE FASTEST BOAT IN THE NAVY.

The Torpedo Boat Destroyer FARRAGUT, on her official trial, steams over THIRTY KNOTS.

THE ENGINE FORGINGS AND SHAFTING

for this Boat were manufactured by

The Bethlehem Iron Company,

SOUTH BETHLEHEM, PA.

STAYBOLTS



FALLS HOLLOW STAYBOLT CO., CUYAHOGA FALLS OHIO.

BOTH HOLLOW AND SOLID, OF THE BEST QUALITY OF CHARCOAL IRON. HOLLOW STAYBOLTS are better than drilled or punched in every way. Cost less too. They save inspections and explosions—warn automatically. If you want solid staybolts, however, let us hear from you. Our circulars and prices will interest you.

LIDGERWOOD IMPROVED

HOISTING ENGINES.

OVER 14,000 IN USE.

ELECTRIC HOISTS,

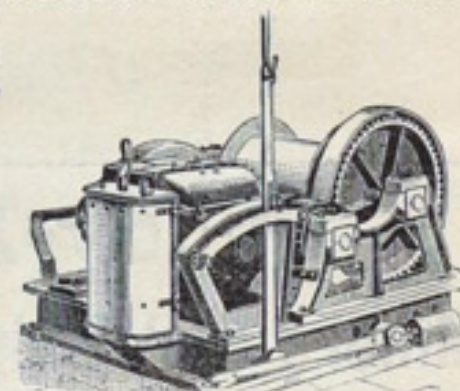
Specially adapted for Docks, Warehouses and Steamships....

Simple, Light and Compact.

SEND FOR CATALOGUE.

LIDGERWOOD MFG. CO.,

96 Liberty Street, NEW YORK.



THE CHASE MACHINE COMPANY,

Engineers and Machinists,

MANUFACTURERS, UNDER THE CHASE PATENTS OF

FOG WHISTLE MACHINES, HOISTING ENGINES, STEERING ENGINES, AUTOMATIC TOWING ENGINES, POWER AND DROP HAMMERS, AND OTHER MACHINERY. ENGINEERS' SUPPLIES, AND GENERAL JOB WORK.

TELEPHONE MAIN 994.

111 Elm Street CLEVELAND, OHIO

NEW YORK.

PHILADELPHIA.
SAN FRANCISCO.

BOSTON.

NEW ORLEANS.

BALTIMORE.

JOHNSON & HIGGINS,

AVERAGE ADJUSTERS AND
FIRE AND MARINE INSURANCE.

Special Facilities for
Placing Marine Lines.

GREAT LAKES
DEPARTMENT.

Guaranty Bldg.,

BUFFALO, N. Y.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

After 20,000 miles of almost continuous steaming since going into commission, including her remarkable trip from San Francisco to Key West, the U. S. Gunboat MARIETTA, equipped with Babcock & Wilcox water tube boilers, ordered the following repair parts:

"T. B. S.—W. D. L.

NAVY DEPARTMENT,
Bureau of Supplies and Accounts,
Washington, D. C.

In reply refer to No. 29181.

Gentlemen:

June 10, 1898.

1. Please forward to the Commanding Officer, U. S. S. 'MARIETTA', Key West, Fla., 8 fire bricks, 4 rights and 4 lefts, No. R. 3440, Babcock & Wilcox boilers, to replace broken bricks between furnace doors.
2. Your bill for these articles should be sent to the same officer and should refer to Steam Engineering Requisition dated June 1, 1898.

THE BABCOCK & WILCOX CO.,
29 Cortlandt St., New York."

Respectfully,

(Sig.) EDWIN STEWART, Paymaster General,
U. S. N.

On her long voyage the MARIETTA was not detained an instant on account of boilers.

THE BABCOCK & WILCOX CO., WATER TUBE BOILERS, 29 Cortlandt St., New York.

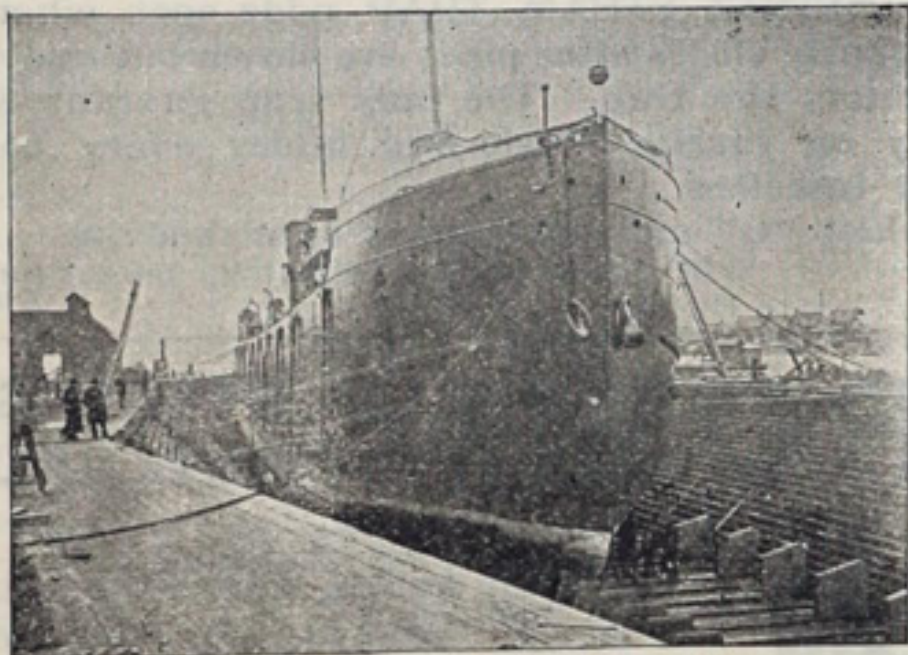


IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

AMERICAN STEEL BARGE CO. STEEL and METAL SHIPS

Of all classes built on the Shortest Possible Notice at our yards at
West Superior, Wis., and also at Everett, Wash.

Plates &
Material
Always
on hand
to Re-
pair all
kinds of
Metal
Ships in
Shortest
Time.



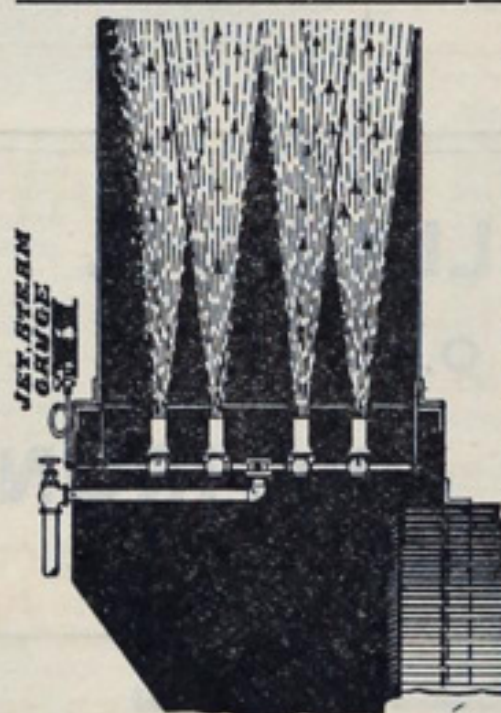
Best
Quality
of Oak
instock
for Re-
pairing
Wooden
Vessels
of all
Classes

SIZE OF DOCK.

Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in
Breadth, Top.....90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom.....52 "	Depth over Sills.....18 "

LARGEST DRY DOCK ON THE LAKES.
Prices for Repairs and Docking same as at lower lake ports
SUPERIOR, WIS.

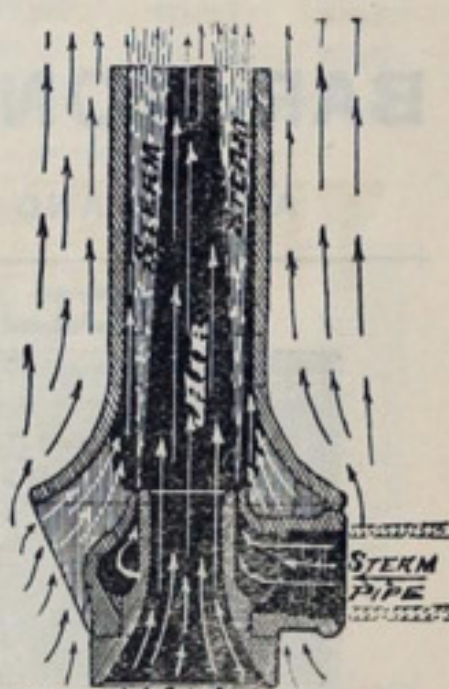
A number of Propeller Wheels in stock at Dry Dock.



THE IMPROVED ANNULAR STEAM JET.

FOR INDUCED DRAFT.

POWERFUL.
ECONOMICAL.
15% TO 25%
INCREASE
IN POWER.



Cut on the right shows a section of Jet Castings, which are attached to Spider in stack, as shown by cut on the left.

Requires No Attention.

Always Ready for Use at a Moment's Notice.

H. BLOOMSBURG & CO., 112 35th St.,
Newport News, Va.
Patentees and Manufacturers.

SECTION OF JETS

BARRY BROS. INDEPENDENT TUG LINE, CHICAGO, SO. CHICAGO.

TUGS	RITA McDONALD,	G. A. TOMLINSON,	WM. DICKINSON,	COMMODORE,	TUGS
	CRAWFORD,	D. P. HALL,	IRA D. SMITH,	WELCOME,	
	C. M. CHARNLEY,	PRODIGY,	JAMES A. QUINN,	JACK BARRY.	

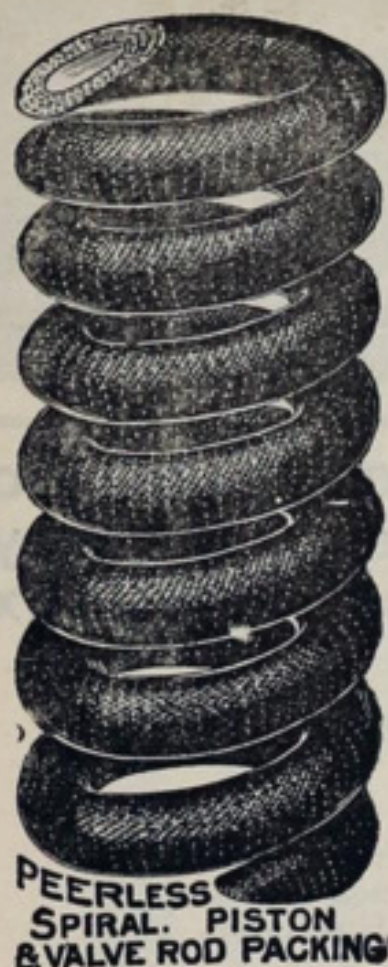
CHICAGO OFFICE:
Telephone 273. 240 South Water St.

SOUTH CHICAGO OFFICE:
92d Street Bridge

Tugs G. A. TOMLINSON, D. P. HALL and PRODIGY
in service at SOUTH CHICAGO at all times.

8 long whistles call our tugs.

Offices open day and night.



Peerless Piston and Valve Rod Packing

IN SPIRAL FORM OR IN COILS.

WILL HOLD 400 LBS. STEAM. 20 YEARS OLD AND NO EQUAL.

Manufactured Exclusively by

PEERLESS RUBBER MFG. CO.,
16 Warren Street, NEW YORK.

FOR SALE by the LEADING SHIP CHANDLERS and SUPPLY HOUSES.

16-24 Woodward Ave.,
DETROIT, MICH.

17-19 Beale St. and 18-24 Main St.,
Agents, SAN FRANCISCO, CAL.

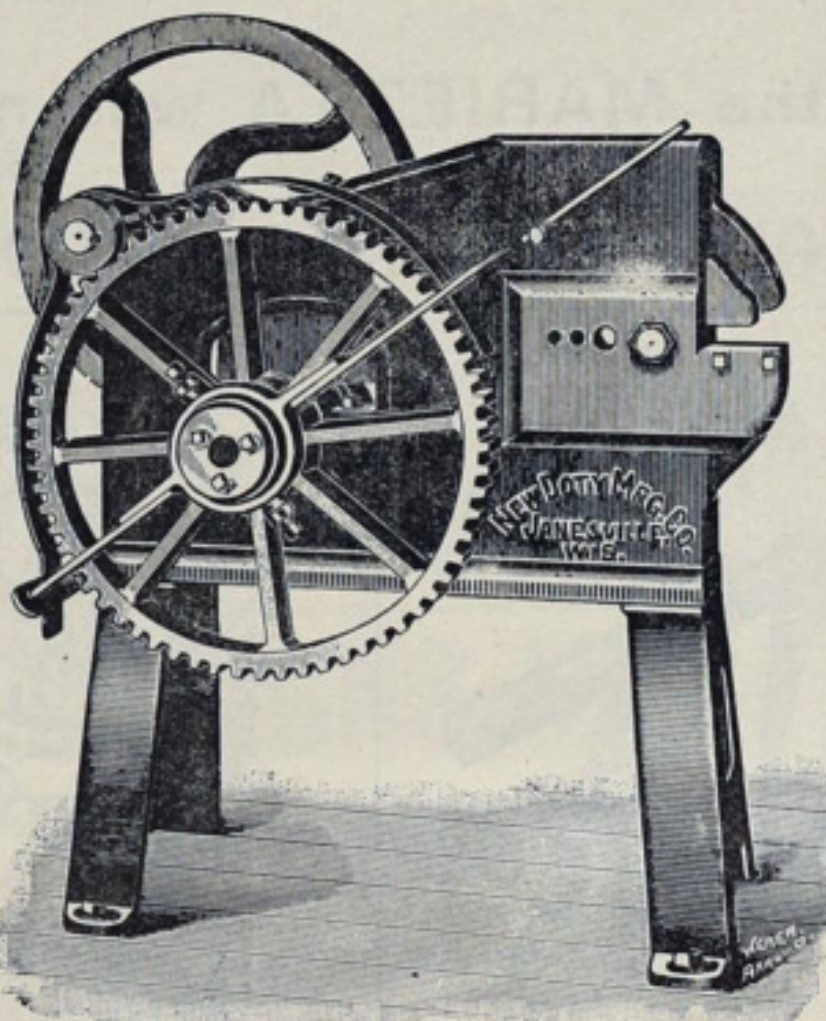
202-210 So. Water St.,
CHICAGO, ILL.

PUNCHES and SHEARS,

For working all sizes of plate
or bar metal

For Ship Yards, Boiler Shops,
Machine Shops,
Blacksmith and
Forge Shops, &c., &c.

SEND FOR CATALOGUE.



HAND AND
BELT POWER

Punches and Shears,

And Bending Rolls.

NEW DOTY MFG. CO.

Janesville, Wisconsin,
U. S. A.

THE BOURNE-FULLER CO.

CLEVELAND, O.

BAR IRON.

PIC IRON.

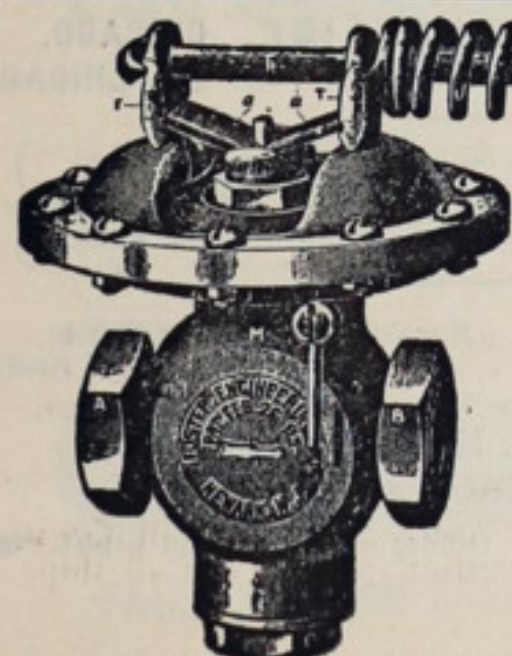
ARCHES AND STRAPS FOR WOODEN VESSELS.

BOILER RIVETS. BOILER TUBES. BRACE IRON.
IRON AND STEEL SHEETS. MACHINERY AND TOOL STEEL.
BESSEMER AND OPEN HEARTH STEEL.
SHIP PLATES, BOILER PLATES, SHIP RIVETS.
BEAMS, CHANNELS, ANGLES, BARS, AND OTHER SHAPES.
BILLETS, BLOOMS AND FORGINGS.
"BYERS" FULL WEIGHT WROUGHT IRON PIPE.

DELTA METAL



PROPELLERS.



U. S. NAVY STANDARD.

THE FOSTER "New Class W" Pressure Regulator.

The Experimental Board of the Bureau
of Steam Engineering of the U. S.
Navy, after recent tests, report that
it is:

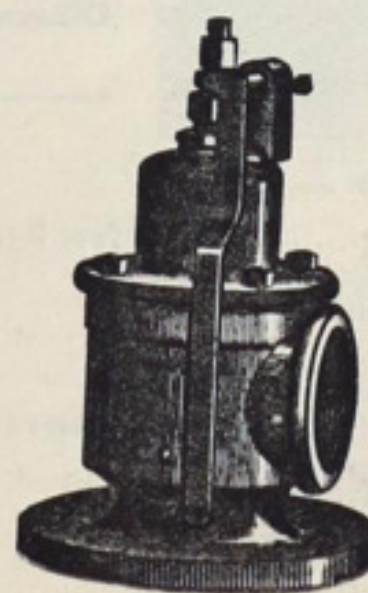
"THE BEST PRESSURE REGULA-
TOR AND REDUCING VALVE
WITHIN THEIR KNOWLEDGE."

Foster Engineering Co.,
NEWARK, N. J.

THE HEINTZ STEAM TRAP wide open when cold—in-
stantly closes after pipes are blown out and live steam
enters the trap. The only trap guaranteed to work
perfectly on marine work and under every condition, if
properly installed.

Booklet "Q" and particulars furnished by
WM. S. HAINES COMPANY, 136 S. Fourth Street,
PHILADELPHIA.

CROSBY STEAM GAGE AND VALVE CO.



CROSBY POP SAFETY VALVES, Locomotive,
Marine and Stationary.
CROSBY WATER RELIEF VALVES, for Pumps,
Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES.
CROSBY STEAM ENGINE INDICATORS, with
Sargent's Electrical Attachment for taking any
number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES
BRANDEN PUMP VALVES; rubber with wire-coil
insertion.
BOSWORTH FEED-WATER REGULATOR, PAT-
ENT GAGE TESTER, and many other special-
ties in Steam Lines.

Main Office and Works: Boston, Mass.

Stores; Boston, New York, Chicago, and London Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.